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ABSTRACT

The effect on performance of different formats for typical mathematics story problems was studied, along with the relationship of certain learner variables. More than 1200 children in grades 3-8, including over 220 learning-disabled students, were tested and/or interviewed. Story problems were in the usual format found in textbooks, an abbreviated verbal format also found in some textbooks, and a format in which a drawing carried much of the information about the problem. It was found that, for most children, the abbreviated format did not result in better performance. The drawn format helped some children, especially those at the lower ends of scales measuring cognitive restructuring and reading comprehension. Learning-disabled children experienced some success, even with problems containing extraneous information. Overall, females scored higher than males on a reading test, but males tended to score higher on problem and cognitive tests. Limits of working memory and deficiencies in understanding the meanings of operations are hypothesized to explain some of the results. (Author/MNS)

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FORMAT VARIABLES AND LEARNER CHARACTERISTICS IN MATHEMATICAL PROBLEM SOLVING

Final Technical Report
SED-8108134

January, 1984

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Abstract

This project studied the effect on performance of different formats for the typical "story" problems in mathematics, and the relationship of certain learner variables to performance on problems in these formats. Overall, more than 1200 children in grades 3-8, including over 220 learning-disabled students, were tested and/or interviewed in addressing these and related concerns, through tests of story problems in three formats and a variety of cognitive tests. The three formats were the usual verbal format found in texts, an abbreviated verbal format also found in some texts, and a format in which a drawing carried much of the information about the problem.

The findings include the following:

a. For most children the abbreviated format has little to offer. It does not give a better performance, in general, than the usual verbal format.

b. A drawn format, however, may help some children, especially those at the lower ends of scales measuring cognitive restructuring or reading comprehension. Spatial visualization measures were less effective predictors.

c. Learning-disabled children can experience some success at story problems, even with problems which contain extraneous information.

d. Overall, with isolated exceptions at different grades, females scored higher than males on a reading test, but the males tended to score higher on the problem tests and cognitive tests.

e. Limits of working memory and deficiencies in understanding the meanings of the operations are hypothesized to explain some of the results.

Format Variables and Learner Characteristics in Mathematical Problem Solving

Final Technical Report
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The major results of this project are contained in articles which have appeared, or will appear, in journals. Appendix A includes a list of these reports, which expand on this document. Appendix B includes data on the problem test items from the major group testings; these data do not appear elsewhere. Appendix C contains another instrument developed for the project.

Project Overview

Focus. The project studied the effect on performance of different formats for "story" problems in mathematics, and the relationship of certain learner variables to performance on problems in different formats. Overall, more than 1200 children in grades 3-8, including over 220 learning disabled students, were tested and/or interviewed in addressing different questions on these themes.

Rationale. The traditional story problem in mathematics presents a difficult instructional area for many teachers. Results of National Assessments of Educational Progress have led analysts to conclude that student performance on multistep story problems or story problems involving irrelevant data leaves much to be desired (Carpenter, et al., 1980; NAEP, 1983). Hence, our knowledge of the variables which may affect student performance on such problems is needed. An exploration of format variables and learner characteristics is one way to add to this knowledge base. In particular, including learning-disabled (LD) children in our study was viewed as a means of

comparing the problem solving abilities of these children with those of normal children.

Most story problems in grades 3-8 are presented verbally. Our thinking was that limiting story problems to this verbal format might result in other, important variables being overlooked. A drawn format for a story problem, for example, might more closely resemble the situation a student would encounter in the market place, and might give some insights into the well-known correlations of problem-solving ability with measures of spatial visualization. Such a format might also enable some learning-disabled students to bypass a learning defect.

Our plan was to gain evidence on such matters by giving tests containing problems in different formats, as well as a variety of cognitive tests, to students both in regular classrooms and in self-contained LD classrooms. Analyses of these data would address the primary questions of the project. As the project progressed, it was deemed desirable and feasible to interview several individual students as they solved story problems. These tests and interviews also led to a limited examination of children's basic understanding of the meanings of the arithmetic operations.

Format Differences

Group tests of story problems were prepared for each of grades 3-7. As we started composing these tests and after discussions with consultant G. Goldin, we decided to include, besides the planned verbal and drawn formats, a third format, the telegraphic. In this telegraphic format a problem is presented verbally, but through sentence fragments.

The telegraphic format was indicated for two reasons. First,

this format is used in some elementary mathematics textbook series, ostensibly to cut down on the reading demands of story problems. Second, and more importantly, this format would enable us decide whether any differences observed in performance between the verbal and drawn formats could be credited to the presence of the drawings. A drawn format for a problem differs in two ways from a verbal format: the presence of the drawing, and less verbiage. Hence, if differences in performance were found, we would not know which of these two, the drawing or the decrease in verbiage, was the reason or whether the reason lay in both differences. By including the telegraphic format, with its decreased verbiage, we would perhaps be able to assign cause to any observed format differences. The literature did not give us any evidence that the telegraphic format was any easier for children than the verbal format.

In a smaller-scale preliminary testing, then, we tested to see whether there were differences in performance on items in the verbal and the telegraphic format in grades 3-7. In no case did the telegraphic items give better performance! At the sixth grade, the verbal items even resulted in a statistically significant, higher mean than the telegraphic items. Citation 1 in Appendix A gives the location of a fuller report of this study.

This finding was surprising to us, and potentially important since some texts include such telegraphic formats in their story problem lists. Because of its importance and since the samples used in that preliminary study were not large, we decided to retain the telegraphic format in the major testing, both to replicate the earlier results and to fill the logical gap between the verbal and the drawn formats.

The problem tests used in the preliminary study were refined and expanded so that for each of grades 3-7, we produced three forms of a problem test containing 24 problems. Each test contained items in each format, and items requiring more than one step to complete, as well as items with extraneous data. The items are included in Appendix B.

These tests resulted in data on 1061 students during the first year of the project. (The difficulties given in Appendix B are based on the 854 non-LD students in this testing.) After blocking on the basis of a reading test (see below), analysis revealed that both the low and high readers scored significantly better on the drawn problems than on the verbal or telegraphic problems, with no statistical difference between the verbal and telegraphic overall. There was, however, a significant format by reading interaction. Examination of the mean scores indicated greater differences between the drawn and verbal (or telegraphic) scores for the low readers than for the high. Hence, this main testing confirmed that the telegraphic format does not give better performance than the verbal. Furthermore, the drawn format gave a performance superior to either of the other formats. A more complete report of these findings can be found in citation 2 in Appendix A. It should be mentioned that the same general pattern of results also held for the 207 children identified as learning-disabled (mainstreamed as well as in self-contained classrooms). Quantitatively, their scores were not as high as those of normal children, but qualitatively, their work was quite similar. One finding of interest was that, contrary to common belief, many LD students do ignore extraneous data when solving story problems, indicating that they are able to gain at least a general understanding

of such problems. Hence, such problems need not be omitted in instruction for LD students. (See citation 6 in Appendix A for a more detailed report of this aspect of the study.)

The tests from one grade to the next contained overlapping items. Hence, it was possible to obtain a cross-sectional indication of the growth in problem solving ability from one grade to the next. It was encouraging but not unexpected to find that the mean scores on the problem tests did increase from one grade to the next. A graph indicating this growth in included in Figure 1 (page 10).

The group testings in the first year gave such uniform results that we decided to invest more time during the second year on interviewing individual students and less on group testing. Nonetheless, a partial replication and longitudinal study were carried out at grades 4 and 6, building on the problem tests from the first year. These data did not result in as many format differences as the first year data, perhaps because of the repeated testing in the same schools (but new students for the replication, of course) and the smaller numbers of subjects. These data are still being analyzed.

The motion format. We managed, by the tailend of the project, to perform a preliminary testing of some problems in a fourth format: a "motion" format, in which motion is incorporated into a drawn format to give a gradual development of the problem, or to show motion that would naturally occur during the problem situation. These were prepared with fifth graders in mind, but were chosen to be completely accessible to learning-disabled students. As a result, the students in regular classrooms who were tested with these problems and their verbal and drawn counterparts topped out, and no statistical differences were found.

Learner Characteristics

We recognized that a better understanding of the relationships among learners' characteristics and their performance on school tasks is needed. Such understandings could have great bearing on the design of instruction and even the choice of curriculum material. Hence, our project gave attention to several learner variables. Grade level and learning disability classification have already been mentioned. Sex was also considered, as were two traits of particular interest for the project work: cognitive restructuring and spatial visualization. For methodological reasons, a general ability construct was also measured. A reading test was the final learner measure used.

Instruments. Cronbach and Snow's (1977) recommendations on methodology for studies of this sort were followed. First, two measures for each of the primary cognitive variables were chosen in order to confirm any resulting relationships. Second, a measure of general ability was collected to test the alternate hypothesis that general ability explains any interactions that might occur.

Cognitive restructuring was measured by a modified version of the Hidden Figures Test from the NLSMA study (Wilson, Cahen, & Begle, 1968), and by a modification of the Find A Shape Puzzle (Adolescent Reasoning Project, 1979). Spatial visualization was measured by the Spatial Relations Test (Science Research Associated, 1963) and by the Punched Holes Test (Wilson, et al., 1968). General ability was measured with the Classifications Subtest of the Culture Fair Test (Institute for Personality and Ability Testing, 1960). Finally, one measure of reading comprehension, Subtest #2 of the Test of Reading Comprehension (Pro-Ed, 1978) was used.

Results suggest that a drawn format is better for students at the

low end of cognitive restructuring or reading comprehension scales, with the telegraphic format not being more helpful that the verbal format. Among the test scores, the reading comprehension measure correlated most highly with performance on the problem tests. The mean score for males tended to be higher than that for females on the spatial tests, the cognitive restructuring tests, and the problem tests, but the females' mean on the reading test was higher than the males'.

A more detailed report of these data is given in citation 3 in Appendix A.

The Interviews and a Follow-up

During the second year of the project, we interviewed 40 children, 8 at each of grades 4-8, in an effort to learn what sort of thinking processes they engaged in while solving problems and how they would respond if asked to make up or paraphrase problems in different formats. We quantified aspects of our interviews and reported some indications from these.

The interviews indicated that the drawings along (no verbiage) did communicate the intended meanings of the problems. Students, in general, cannot recall all the important data in a problem after the problem presentation is removed from sight, even after reading and studying the problem. (Exact numerical values were not required.) The question for a problem was often omitted. Students did show an ability to pick out similar problems ("a problem that would be good practice" for a given problem). Citation 8 in Appendix A gives the location of a fuller report of the interview study.

A Follow-up. The interview data also suggested that some students might have inadequately formed concepts for the operations.

That is, even though they could carry out multiplication computations with some degree of facility, they might not be able to tell when multiplication was the correct operation to choose. Such a deficiency, of course, could result in at best a haphazard approach to solving story problems. To gain further evidence on this hypothesis, we designed a test to see how well students could choose the proper operation for simplified settings (see Appendix C). Data from 171 sixth graders from five schools indicated that for each of multiplication and division, nearly one-quarter of the students may have lacked an understanding of the operations adequate to guide them while they solve story problems. A report of this study is located in citation 7 in Appendix A, with an informal, teacher-oriented article in citation 5.

Postlude and Prelude

Open questions. Like most studies, this project has perhaps suggested a new question for each one it has answered. For example, we could find no guidance in the literature as to how problems in a drawn format should be designed. Is there a "syntax" for drawings? We were unable to determine, with any degree of confidence, why the drawn format gave a better performance during the first year of testing; some of the manuscripts give as a hypothesis the relative demands on working memory of the different formats. The lack of cohesiveness of the measures of cognitive restructuring or of spatial visualization was not a new finding but was disappointing; can we design different measures for the same construct which do hang together better?

Ongoing and/or planned. Several facets of the project are still under examination or will be given further testing. We intend to test

the motion format with either fourth graders or fifth graders earlier in the school year. The transcripts from the interviews of the 6-8 graders deserve further examination. The group tests give a mass of data inviting further study. An error analysis of the problems on these tests should be instructive, as should be a problem-by-problem analysis, perhaps involving the cognitive measures. A study to see whether further instruction on the concepts of multiplication and division does enable students to solve problems better has been proposed.

We expect that this continuing work will give even more insights into format variables and learner characteristics in mathematical problem solving. We are grateful to the National Science Foundation for the support of the start of these lines of inquiry.

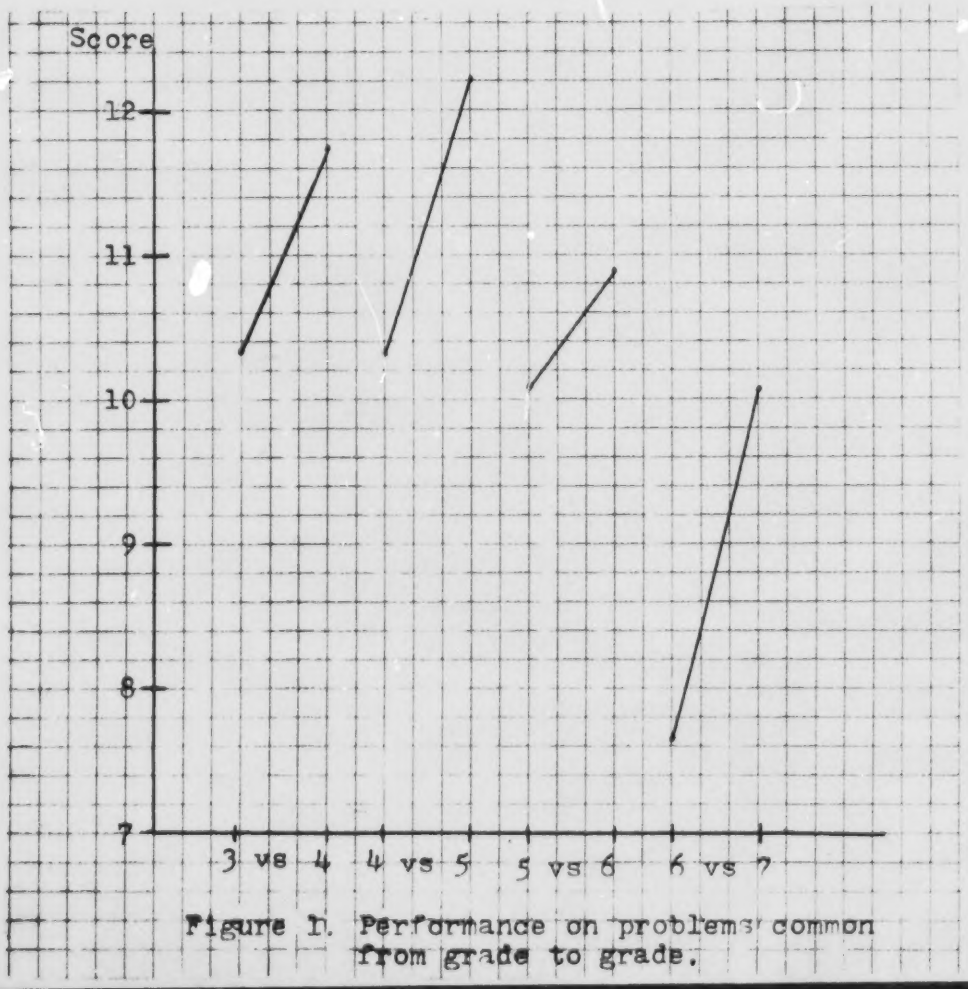

Figure 1. Performance on problems common from grade to grade.

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Carpenter, T. P., Corbitt, M. K., Kepner, H. S., Jr., Lindquist, M. M., & Reys, R. E. (1980). Solving verbal problems: results and implications from National Assessment. The Arithmetic Teacher, 28, 8-12.

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Wilson, J. W., Cahen, L. S., & Begle, E. G. (1968). NLSMA Reports: No. 1, Part A, X-Population Test Batteries. Stanford, CA: School Mathematics Study Group.

Appendix A

Citations for Manuscripts Based on the Project
(All journal manuscripts jointly by Threadgill-Sowder, Sowder, J. Moyer, and M. Moyer, project investigators.)

1. Story problem formats: verbal versus telegraphic. Journal for Research in Mathematics Education, 1984, 15, 64-68.

2. Story problem formats: drawn versus verbal versus telegraphic. Submitted to Journal for Research in Mathematics Education.

3. Cognitive variables and performance on mathematical story problems. To appear in Journal of Experimental Education.

4. A case against 'telegraphing' story problems for poor readers. To appear in The Reading Teacher.

5. Diagnosing a student's understanding of operations. To appear in The Arithmetic Teacher.

6. Performance of learning-disabled students on different formats of story problems with extraneous data. Submitted to Learning Disabilities Quarterly.

7. Children's grasp of concepts of arithmetic operations. Submitted to Elementary School Journal.

8. Story problem formats: some interview results. 1983. (ERIC Document Reproduction Service No. ED 229 419)

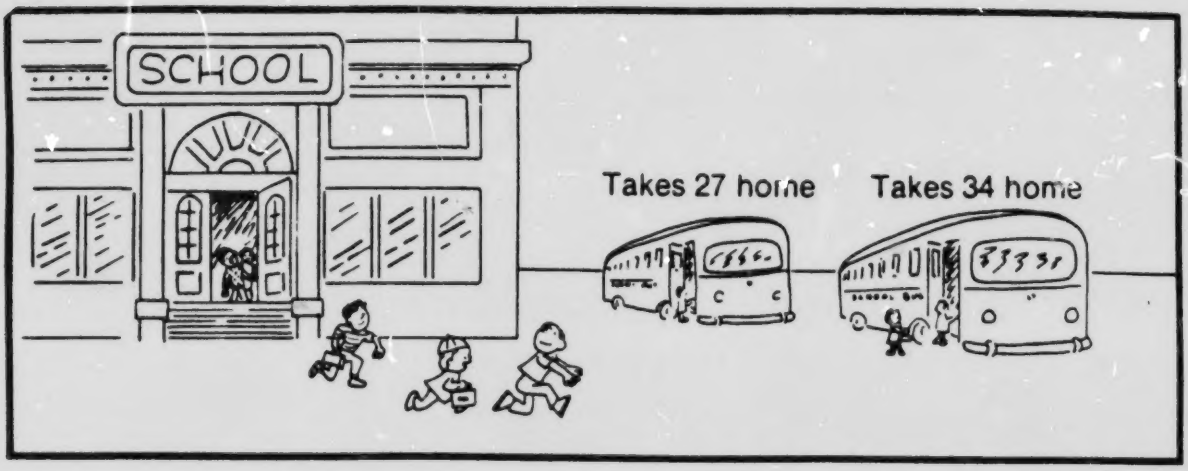
9. Individual difference variables and story problem performance. Proceedings of the 6th International Conference for Psychology of Mathematics Education, 1982.

10. Modes of presentation for mathematical story problems. Proceedings of the 6th International Conference for Psychology of Mathematics Education, 1982.

Appendix B

Problems Used in the Group Testing, With Percent Correct*

*Based on data from 854 "normal" students, grades 3-7, during the first year of the project. Scoring was based on correct choice(s) of operations; "percents correct" given are the percents of students who selected all (one or two, depending on the problem) operations correctly. Not represented are the students who received partial credit in a multistep problem.



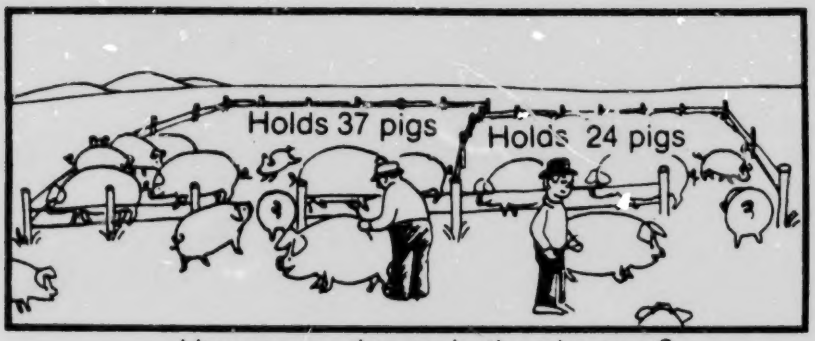
How many children ride the buses home?

First school bus, 27 children
Other school bus, 34 children
How many children ride the buses home?

Two school buses take children home.
One bus takes 27 children home. The
other bus takes 34 children home. How
many children ride the buses home?

Buses problem--compare pigs, cattle problems

Format	Grade 3
D	91.8
T	80.8
V	82.4



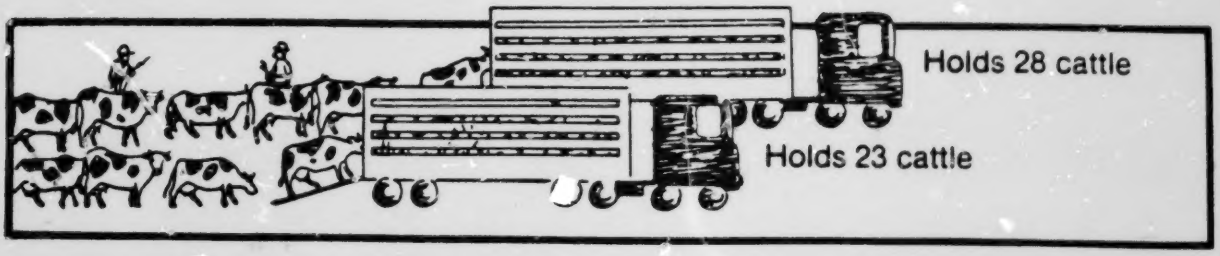
How many pigs go in the pig pens?

First pig pen, 37 pigs
Other pig pen, 24 pigs
How many pigs go in the pig pens?

Two pig pens hold pigs. The first pen holds 37 pigs. The other pen holds 24 pigs. How many pigs go in the pig pens?

Pigs problem--compare buses, cattle problems

Format	Grade 3
D	84.9
T	90.0
V	81.6



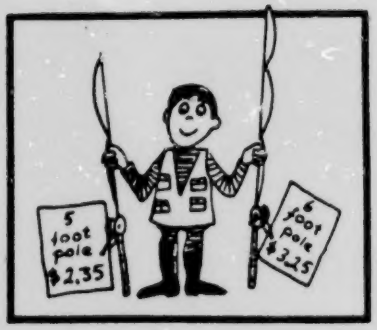
How many cattle ride in the trucks?

First cattle truck, 28 cattle
Other cattle truck, 23 cattle
How many cattle ride in the trucks?

Two trucks carry cattle. The first truck holds 28 cattle. The other truck holds 23 cattle. How many cattle ride in the trucks?

Cattle problem--compare buses, pigs problems

Format	Grade 3
D	86.5
T	86.5
V	84.1



Spends how much in all?

Gets fishing rod, 5 feet long, $2.35
Gets other fishing rod, 6 feet long, $3.25
Spends how much in all?

Chris gets two fishing rods. One fishing rod is 5 feet long. It costs $2.35. The other fishing rod is 6 feet long. It costs $3.25. How much does Chris spend in all?

Fishing rod problem--compare apples, hamburger problems

Format	Grade 3	Grade 4
D	86.3	87.3
T	86.0	94.9
V	82.4	91.1

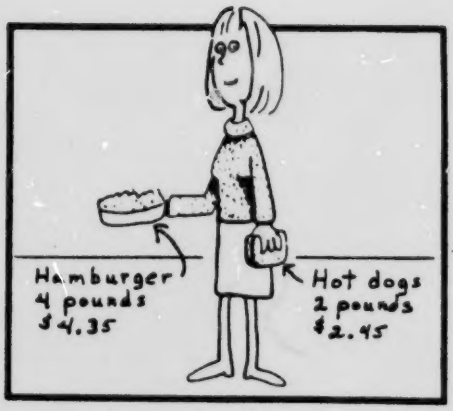
Spends how much in all?

Gets red apples, 5 pounds for $2.25
Gets yellow apples, 12 pounds for $5.35
Spends how much in all?

Bob gets 5 pounds of red apples. They cost $2.25. He gets 12 pounds of yellow apples. They cost $5.35. How much does Bob spend in all?

Apples problem--compare fishing rod, hamburger problems

Format	Grade 3	Grade 4
D	89.8	89.8
T	91.8	80.7
V	70.6	83.0



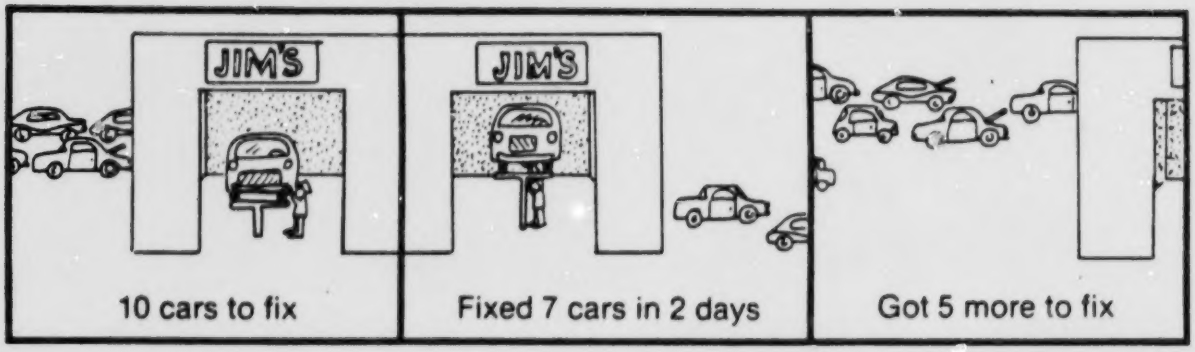
Spends how much in all?

Hamburger, 4 pounds for $4.35
Hot dogs, 2 pounds for $2.45
Costs how much in all?

Ann's mother gets 4 pounds of hamburger. It costs $4.35. She gets 2 pounds of hot dogs. It costs $2.45. How much does Ann's mother spend in all?

Hamburger problem--compare fishing rod, apples problems

Format	Grade 3	Grade 4
D	82.0	92.6
T	81.1	76.8
V	72.0	87.5



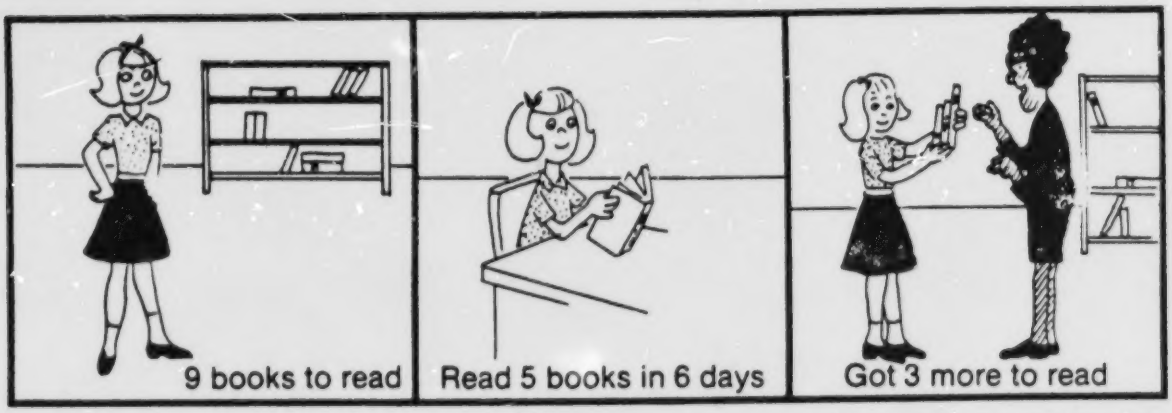
How many to fix now?

Man
10 cars to fix
Fixed 7 cars in 2 days
Then got 5 more cars to fix
How many to fix now?

Jim got 10 cars to fix. He fixed 7 cars in 2 days. Then he got 5 more cars to fix. How many cars does Jim have to fix now?

Cars problem--compare books, bones problems

Format	Grade 3	Grade 4
D	52.9	47.1
T	36.0	49.1
V	21.6	43.1



Girl
9 books to read
Read 5 books in 6 days
Then got 3 more books to read
How many to read now?

Jane has 9 books to read. She read 5 books in 6 days. Then she got 3 more books to read. How many books does Jane have to read now?

Books problem--compare cars, bones problems

Format	Grade 3	Grade 4
D	44.2	35.9
T	35.6	41.8
V	35.3	48.2

How many to hide now?

Dog
15 bones to hide
Hid 6 bones in 4 hours
Then got 5 more bones to hide
How many to hide now?

A dog had 15 bones to hide. It hid 6 bones in 4 hours. Then it got 5 more bones to hide. How many bones does the dog have to hide now?

Bones problem--compare cars, books problems

Format	Grade 3	Grade 4
D	20.4	19.3
T	37.5	30.8
V	30.2	22.2

15 flowers
10 flowers picked
Then 6 more flowers grew.
How many flowers now?

There are 15 flowers. Mary picked 10 flowers. Then 6 more flowers grew. How many flowers are there now?

Flowers problem--compare money, bananas problems

Format	Grade 3
D	34.0
T	57.5
V	28.9

How much now?

Had 16¢
Lost 10¢
Then got 5¢ more
How much now?

Sam had 16¢. He lost 10¢. Then he got 5¢ from his mother. How much does he have now?

Money problem--compare flowers, bananas problems

Format	Grade 3
D	58.5
T	53.1
V	44.0

How many now?

9 bananas
Ate 6 bananas
Then got 5 more bananas
How many bananas now?

A monkey had 9 bananas. It ate 6 bananas. Then it got 5 more bananas. How many bananas does the monkey have now?

Bananas problem--compare flowers, money problems

Format	Grade 3
D	54.7
T	40.0
V	51.0

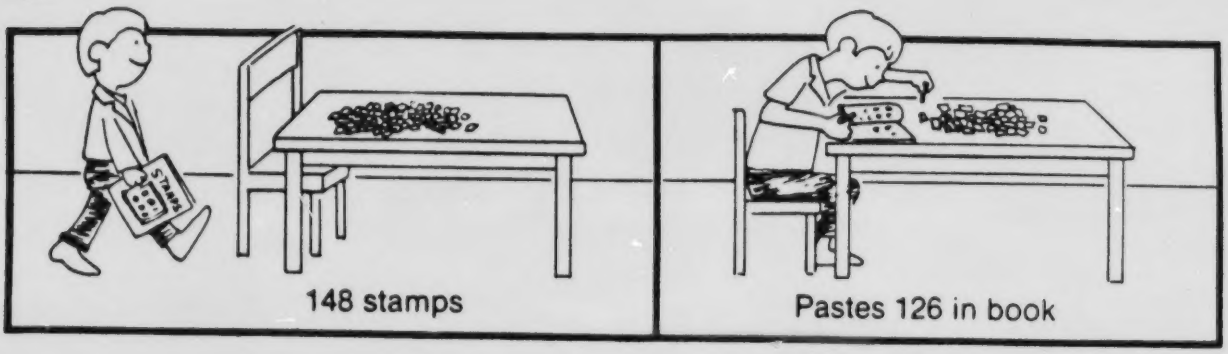
How many books not checked out?

Library has 284 books
Check out 162 books
How many books not checked out?

The school library has 284 books. Today children check out 162 books. How many books are not checked out of the library?

Library problem--compare stamps, marbles problems

Format	Grade 3	Grade 4
D	75.0	82.5
T	82.7	91.5
V	78.4	83.9



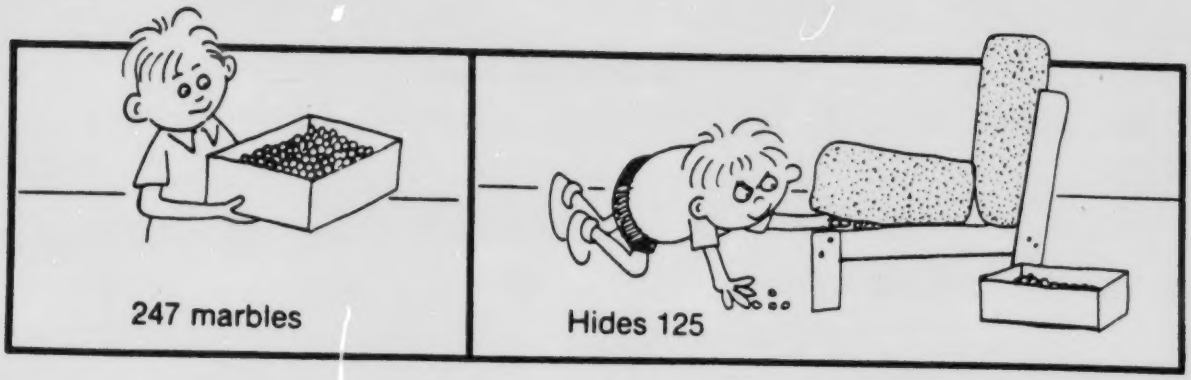
How many stamps not pasted?

Has 148 stamps
Pastes 126 in book
How many stamps not pasted?

Joe has 148 stamps. He pastes 126 of the stamps in a stamp book. How many stamps are not pasted in the stamp book?

Stamps problem--compare library, marbles problems

Format	Grade 3	Grade 4
D	80.4	88.1
T	82.7	83.9
V	80.4	77.8



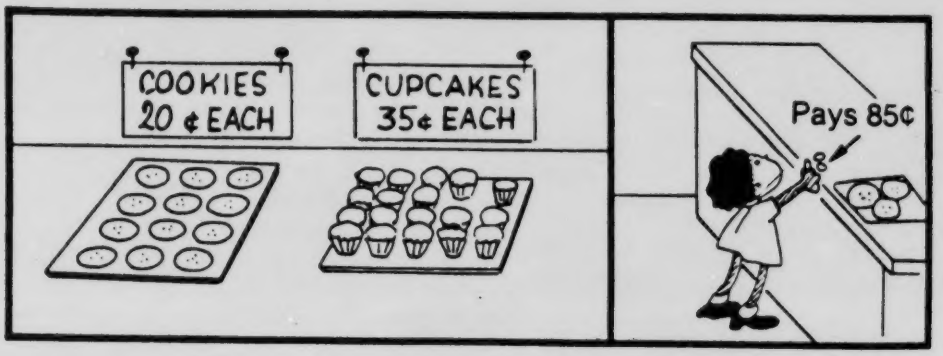
How many marbles not hidden?

Has 247 marbles
Hides 125
How many marbles not hidden?

Kim has 247 marbles. She hides 125 of the marbles. How many marbles are not hidden?

Marbles problem--compare library, stamps problems

Format	Grade 3	Grade 4
D	81.3	87.7
T	75.5	82.1
V	80.0	88.1



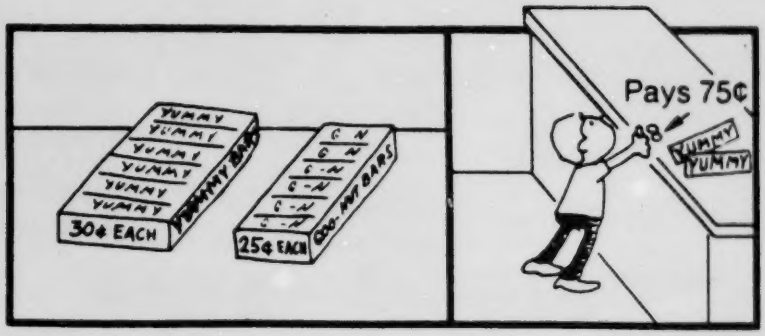
Gets back how much money?

Cookies, 20¢ each
Cupcakes, 35¢ each
Gets 3 cookies
Pays 85¢
Gets how much money back?

Cookies cost 20¢ each. Cupcakes cost 35¢ each. Lee gets 3 cookies. Lee pays 85¢. How much money does Lee get back?

Cookies problem--compare candy bars, snakes problems

Format	Grade 3
D	27.1
T	30.8
V	12.5



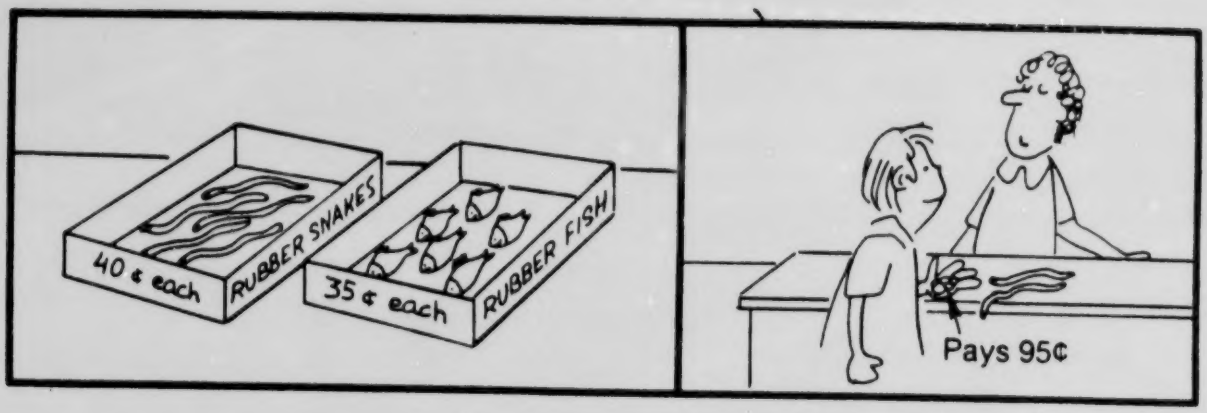
Gets back how much money?

Yummy bars, 30¢ each
Goo-nut bars, 25¢ each
Gets 2 Yummy bars
Pays 75¢
Gets how much money back?

Yummy bars cost 30¢ each. Goo-nut bars cost 25¢ each. Nicky gets 2 Yummy bars. Nicky pays 75¢. How much money does Nicky get back?

Candy bars problem--compare cookies, snakes problems

Format	Grade 3
D	14.0
T	20.0
V	37.5



Gets back how much money?

Rubber snakes, 40¢ each
Rubber fish, 35¢ each
Gets 2 rubber snakes
Pays 95¢
Gets how much money back?

Rubber snakes cost 40¢ each. Rubber fish cost 35¢ each. Jack gets 2 rubber snakes. Jack pays 95¢. How much money does Jack get back?

Snakes problem--compare cookies, candy bars problems

Format	Grade 3
D	19.2
T	44.7
V	31.4

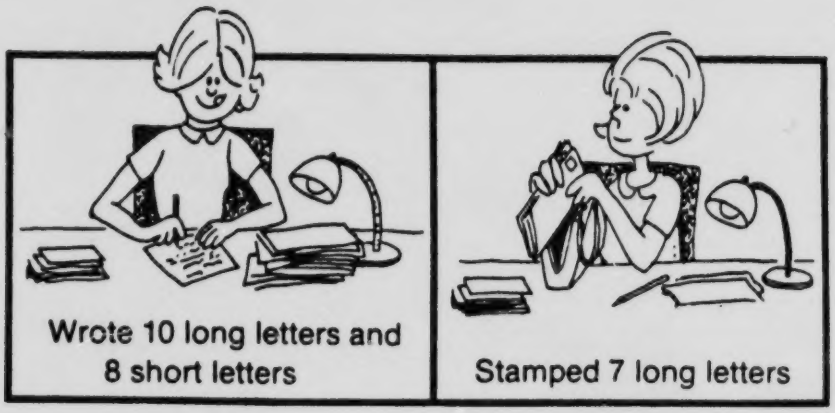
How many big dishes not broken?

Lady
Got 10 big dishes
Got 6 little dishes
Broke 4 big dishes
How many big dishes not broken?

A lady got 10 big dishes and 6 little dishes. She broke 4 of the big dishes. How many big dishes are not broken?

Dishes problem--compare fish, letters problems

Format	Grade 3
D	57.1
T	51.0
V	60.0



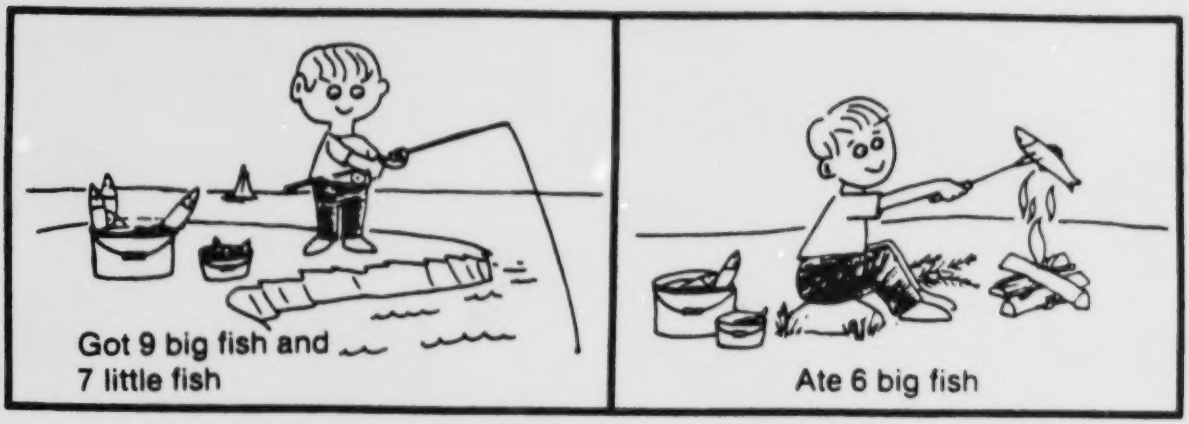
How many long letters not stamped?

Woman
Wrote 10 long letters
Wrote 8 short letters
Stamped 7 long letters
How may long letters not stamped?

A woman wrote 10 long letters and 8 short letters. She stamped 7 long letters. How many long letters are not stamped?

Letters problem--compare fish, dishes problems

Format	Grade 3
D	56.0
T	43.1
V	46.3



How many big fish not eaten?

Fisherman
Got 9 big fish
Got 7 little fish
Ate 6 big fish
How many big fish not eaten?

A fisherman got 9 big fish and 7 little fish. He ate 6 big fish. How many big fish are not eaten?

Fish problem--compare dishes, letters problems

Format	Grade 3
D	52.8
T	39.6
V	43.5

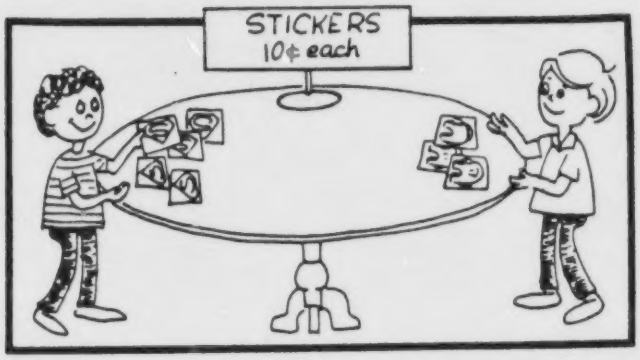
How much money will they get for all?

Empty bottles, 10¢ each
Jan, 6 empty bottles
Nan, 3 empty bottles
How much money will they get for all?

Empty bottles are 10¢ each. Jan has 6 empty bottles. Nan has 3 empty bottles. How much money will they get for all the bottles?

Bottles problem--compare stickers, funny books problems

Format	Grade 3	Grade 4
D	50.0	62.7
T	50.0	52.0
V	48.1	61.8



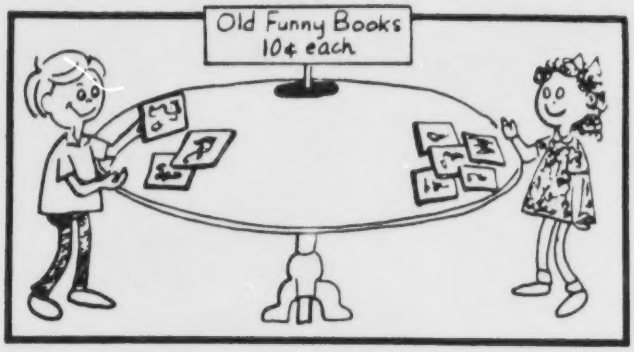
How much money will they pay for all?

Stickers, 10¢ each
Mick, 5 Superman stickers
Dick, 4 Star Wars stickers
How much money will they pay for all?

Stickers cost 10¢ each. Mick gets 5 Superman stickers. Dick gets 4 Star Wars stickers. How much money will they pay for all the stickers?

Stickers problem--compare bottles, funny books problems

Format	Grade 3	Grade 4
D	61.2	83.9
T	52.9	63.5
V	32.7	50.9



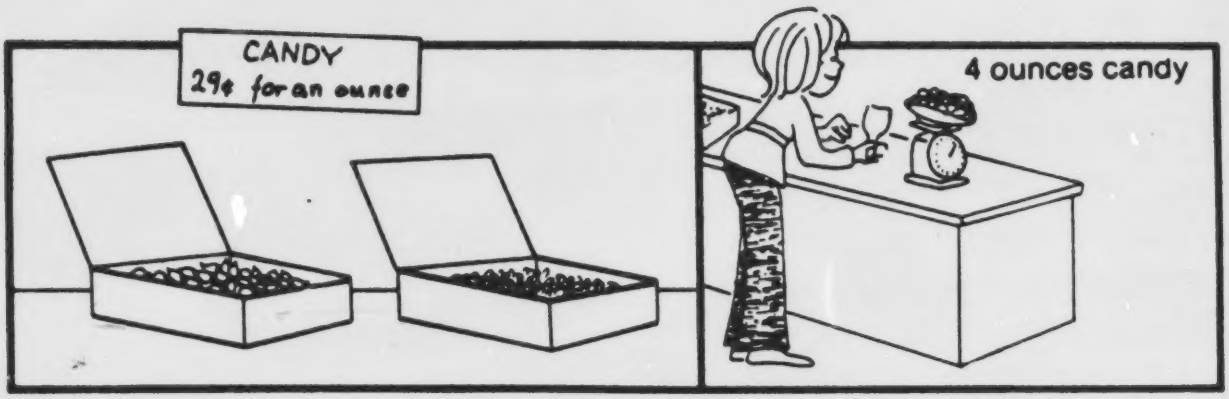
How much money will they pay for all?

Old funny books, 10¢ each
Bill, 3 old funny books
Marie, 5 old funny books
How much money will they pay for all?

Old funny books are 10¢ each. Bill gets 3 old funny books. Marie gets 5 old funny books. How much money will they pay for all?

Funny books problem--compare bottles, stickers problems

Format	Grade 3	Grade 4
D	66.0	78.2
T	37.0	63.1
V	51.0	57.9



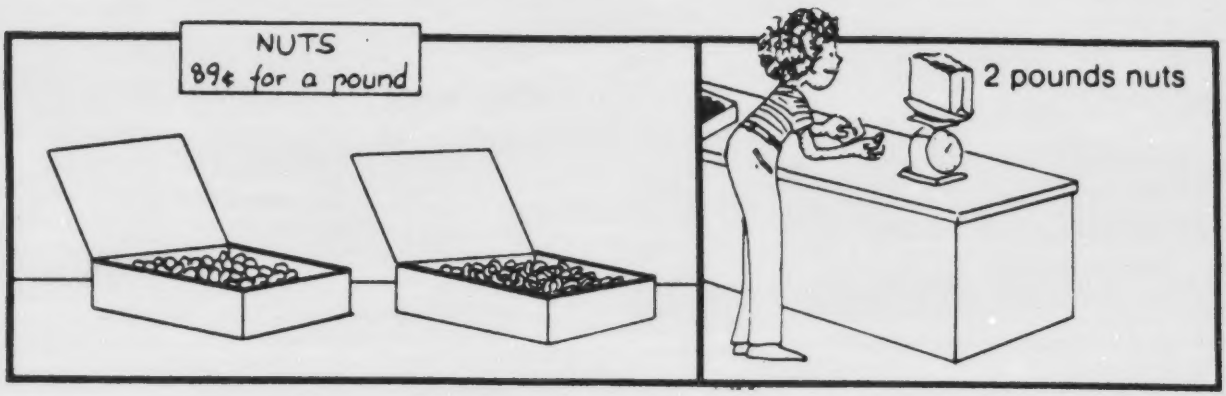
How much will the candy cost?

Ounce of candy costs 29¢
Wants 4 ounces candy
How much will the candy cost?

An ounce of hard candy costs 29¢. Kate wants 4 ounces of candy. How much will the candy cost?

Candy problem--compare nuts, plums problems

Format	Grade 4	Grade 5
D	79.7	89.7
T	86.0	85.5
V	70.9	89.4



How much will the nuts cost?

Pound unshelled nuts costs 89¢
Wants 2 pounds nuts
How much will the nuts cost?

A pound of unshelled nuts costs 89¢. Peg wants 2 pounds of the nuts. How much will the nuts cost?

Nuts problem--compare candy, plums problems

Format	Grade 4	Grade 5
D	83.9	83.9
T	80.0	93.8
V	79.0	89.8

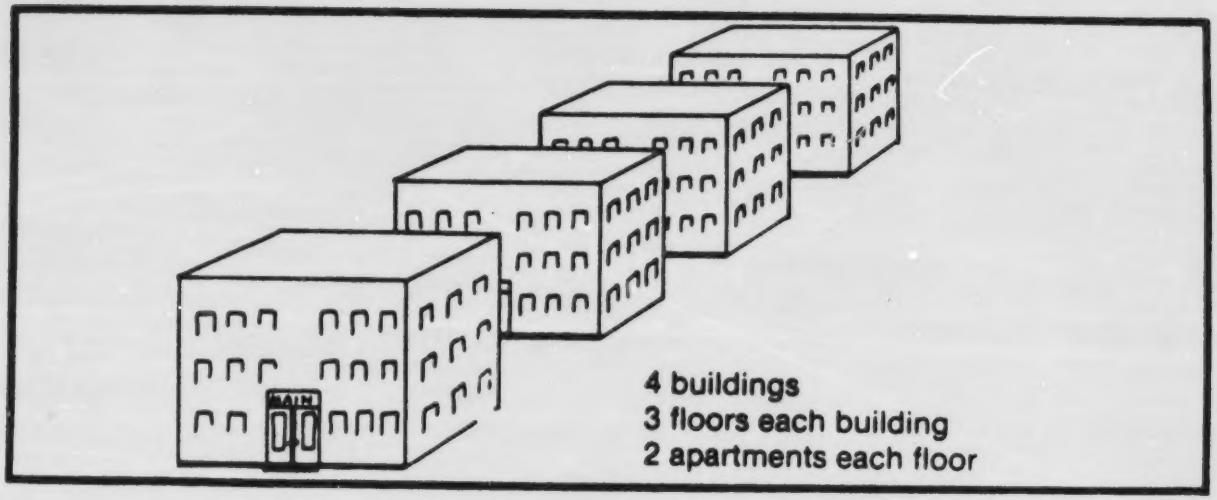
How much will the plums cost?

Pound of plums costs 49¢
Wants 3 pounds plums
How much will the plums cost?

A pound of plums costs 49¢. Sam wants 3 pounds of plums. How much will the plums cost?

Plums problem--compare candy, nuts problems

Format	Grade 4	Grade 5
D	67.9	93.8
T	82.8	89.8
V	88.7	89.1



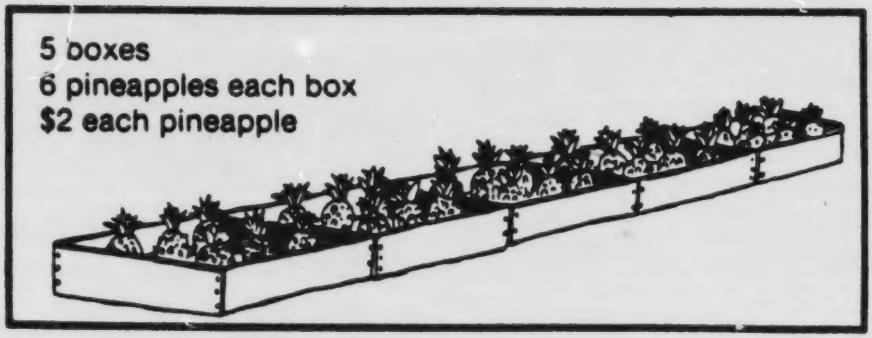
How many apartments in all?

4 apartment buildings
3 floors each building
2 apartments each floor
How many apartments in all?

A town has 4 apartment buildings. Each building has 3 floors. Each floor has 2 apartments. How many apartments are there in all?

Apartments problem--compare pineapples, Xmas stickers problems

Format	Grade 4	Grade 5
D	41.4	44.6
T	27.5	48.2
V	32.1	29.8



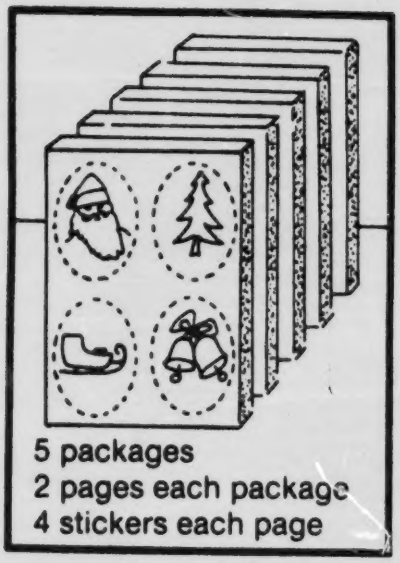
Cost for all pineapples?

5 boxes of pineapples
6 pineapples each box
$2 each pineapple
Cost for all pineapples?

A store has 5 boxes of pineapples. There are 6 pineapples in each box. Each pineapple costs $2. What is the cost for all the pineapples?

Pineapples problem--compare apartments, Xmas stickers problems

Format	Grade 4	Grade 5
D	30.4	42.9
T	32.7	34.8
V	38.6	47.4



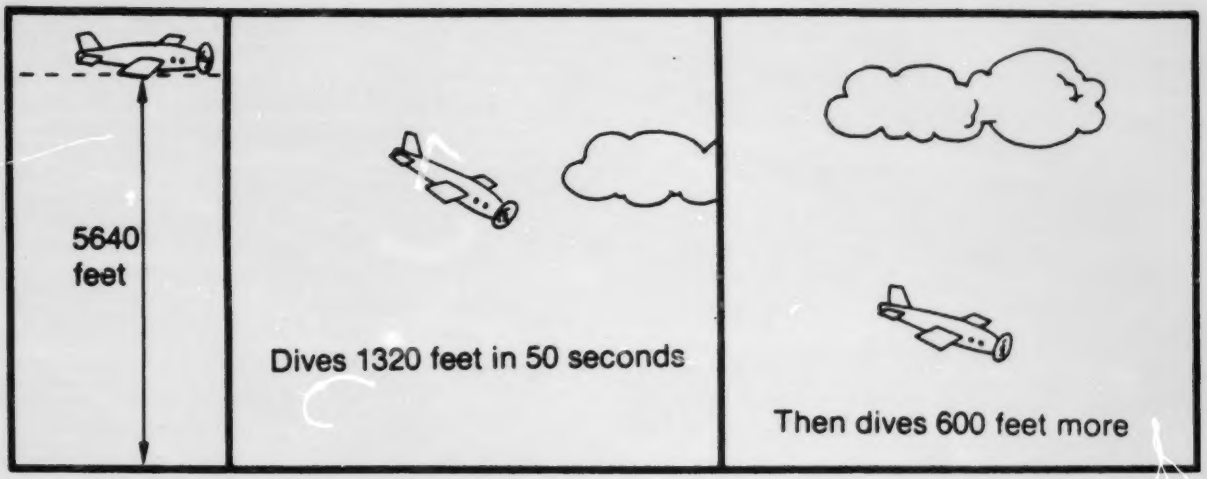
How many stickers in all?

5 packages of Christmas stickers
2 pages each package
4 stickers each page
How many stickers in all?

A woman has 5 packages of Christmas stickers. Each package has 2 pages of stickers. Each page has 4 stickers. How many stickers are there in all?

Xmas stickers problem--compare apartments, pineapples problems

Format	Grade 4	Grade 5
D	38.6	38.3
T	32.1	32.7
V	19.2	40.7

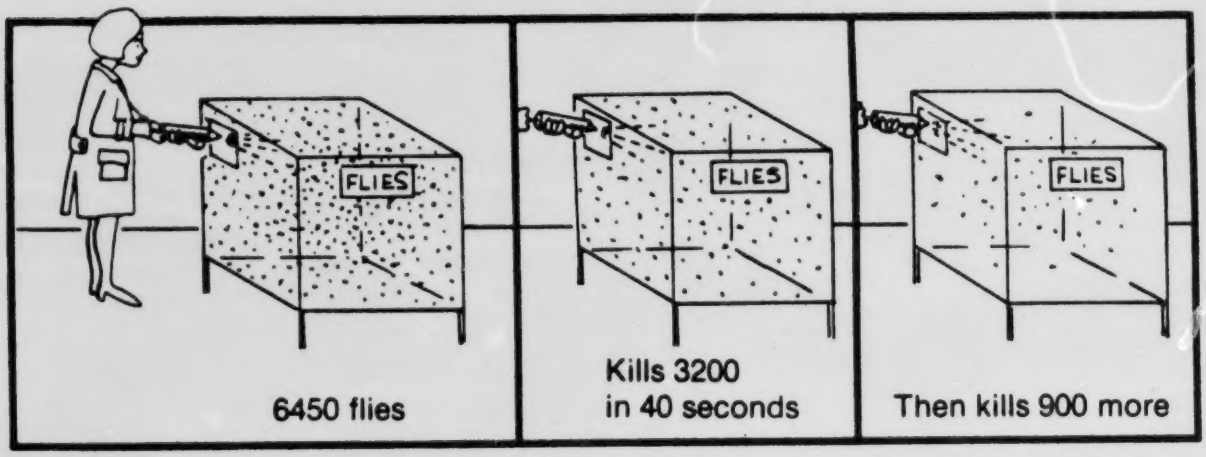


Airplane pilot
5640 feet high
Dives down 1320 feet in 50 seconds
Then flies down 600 feet more
How high now?

An airplane pilot is 5640 feet high, The pilot dives down 1320 feet in 50 seconds. Then the pilot flies down 600 feet more. How high is the pilot now?

Airplane problem--compare scientist, trees problems

Format	Grade 4	Grade 5
D	38.5	38.9
T	37.5	51.1
V	41.4	40.7



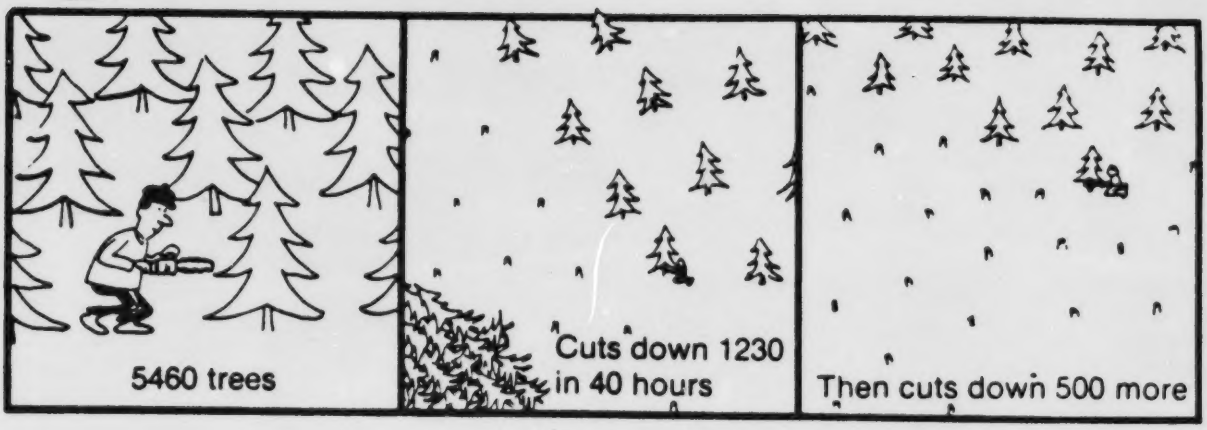
How many flies now?

Scientist
6450 flies in a cage
Kills 3200 flies in 40 seconds
Then kills 900 more
How many flies now?

A scientist has 6450 flies in a cage. The scientist kills 3200 flies in 40 seconds with a new drug. Then the scientist kills 900 more flies. How many flies does the scientist have now?

Scientist problem--compare airplane, trees problems

Format	Grade 4	Grade 5
D	53.9	59.6
T	42.1	51.8
V	46.3	51.9



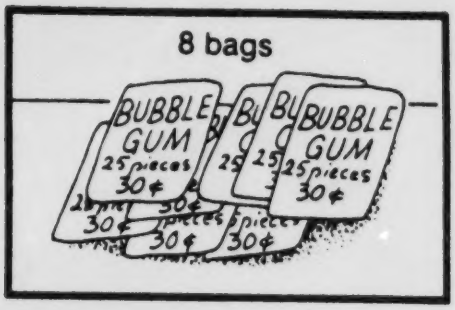
How many trees standing now?

Christmas tree farmer
5460 trees
Cuts down 1230 trees in 40 hours
Then cuts down 500 more
How many trees standing now?

A Christmas tree farmer has 5460 trees. He cuts down 1230 of the trees in 40 hours. Then he cuts down 500 more trees. How many trees are standing now?

Trees problem--compare airplane, scientist problems

Format	Grade 4	Grade 5
D	55.2	63.6
T	40.0	60.0
V	50.0	61.7



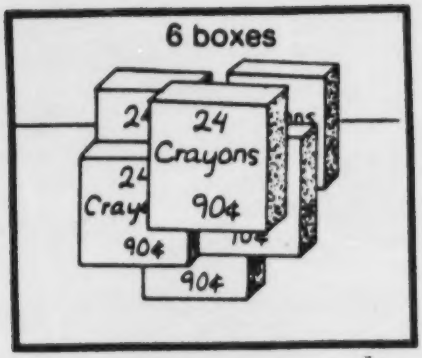
How much for 8 bags?

8 bags of gum
25 pieces in each bag
Each bag cost 30¢.
How much for 8 bags?

There are 8 bags of bubble gum, There are 25 pieces in each bag. Each bag costs 30¢. How much do the 8 bags cost?

Gum problem--compare crayons, paper problems

Format	Grade 4	Grade 5
D	75.9	95.8
T	58.6	77.6
V	49.1	72.2



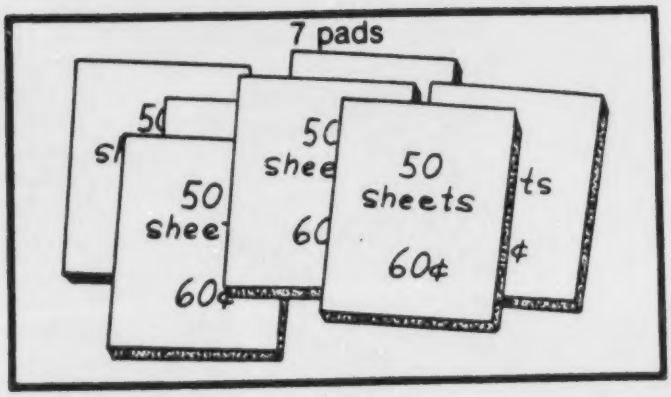
How much for 6 boxes?

6 boxes of crayons
24 crayons in each box
Each box costs 90¢.
How much for 6 boxes?

There are 6 boxes of crayons. There are 24 crayons in each box. Each box costs 90¢. How much do the 6 boxes cost?

Crayons problem--compare gum, paper problems

Format	Grade 4	Grade 5
D	71.9	82.8
T	69.1	78.2
V	57.7	84.1



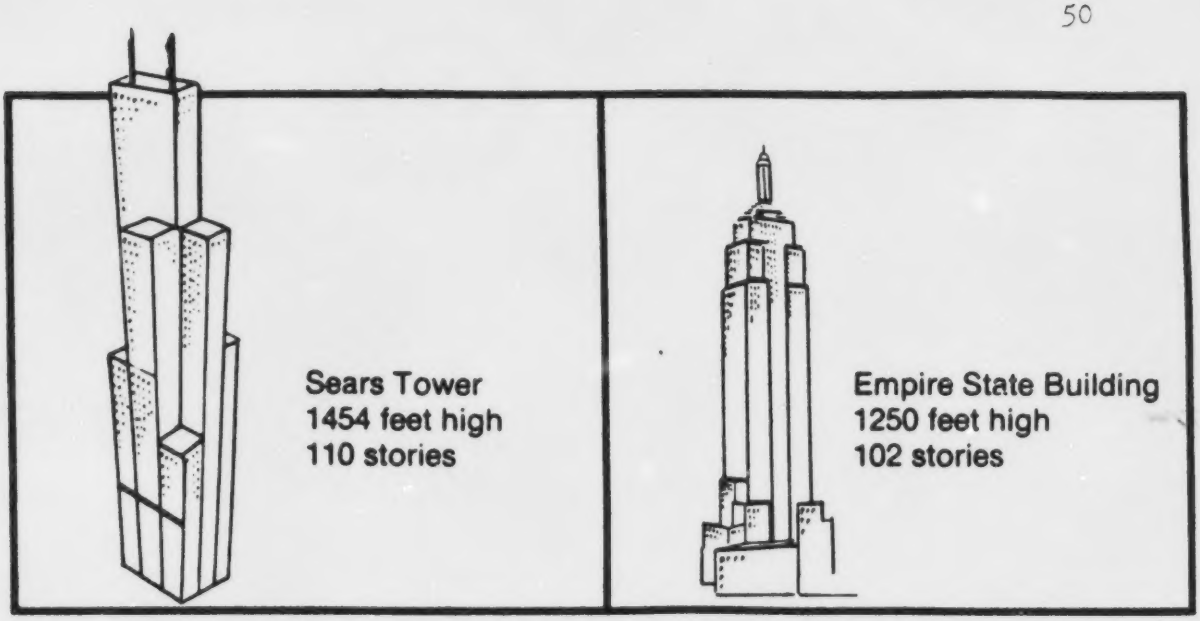
How much for 7 pads?

7 pads of paper
50 sheets of paper in each pad
Each pad costs 60¢.
How much for 7 pads?

There are 7 pads of paper. There are 50 sheets of paper in each pad. Each pad costs 60¢. How much do the 7 pads cost?

Paper problem--compare gum, crayons problems

Format	Grade 4	Grade 5
D	83.9	85.7
T	60.0	79.6
V	69.6	69.1



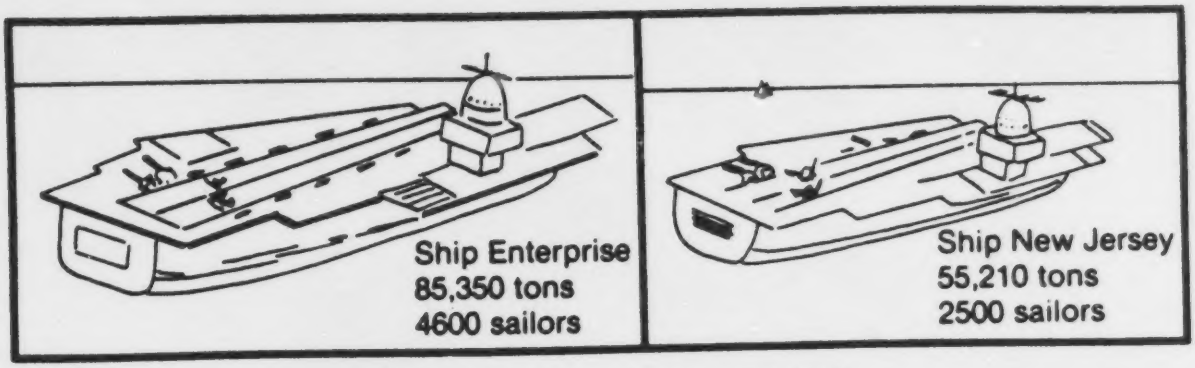
Sears Tower, how many feet higher?

Sears Tower, 1454 feet high, 110 stories
Empire State Building, 1250 feet high,
120 stories
Sears Tower, how many feet higher?

Sears Tower is 1454 feet high and has
110 stories. The Empire State Building
is 1250 feet high and has 102 stories.
How many feet higher is Sears Tower?

Sears problem--compare Tanner, Enterprise problems

Format	Grade 5	Grade 6
D	83.0	79.3
T	74.6	83.3
V	78.2	69.6



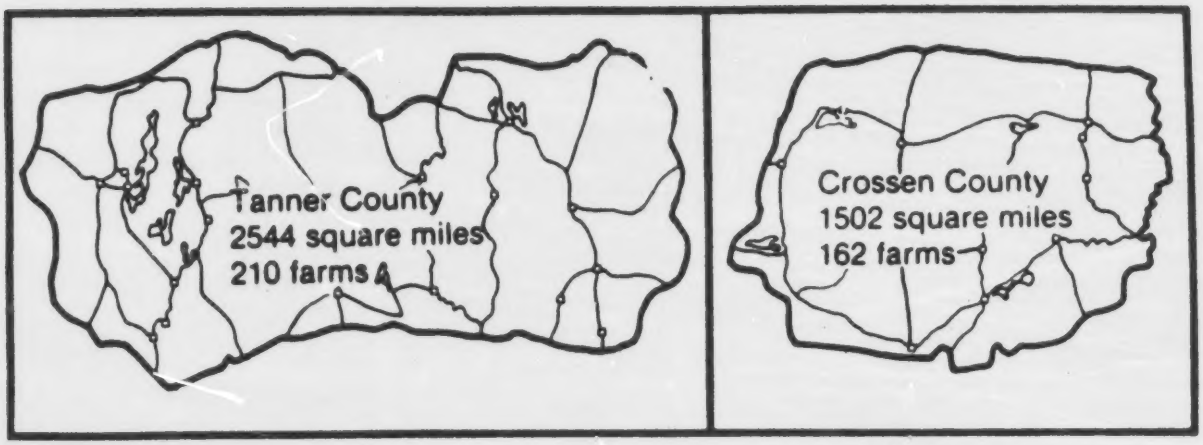
Enterprise, how many more tons?

Ship Enterprise, 85,350 tons,
4600 sailors
Ship New Jersey, 55,210 tons,
2500 sailors
Enterprise, how many more tons?

The ship Enterprise has a weight of 85,350 tons and 4600 sailors. The ship New Jersey has a weight of 55,210 tons and 2500 sailors. How many more tons does the Enterprise weigh?

Enterprise problem--compare Sears, Tanner problems

Format	Grade 5	Grade 6
D	73.6	64.9
T	63.6	65.5
V	63.0	71.7



Tanner County, how many more square miles?

Tanner County, 2544 square miles,
210 farms
Crossen County, 1502 square miles,
162 farms
Tanner County, how many more square
miles?

Tanner County has 2544 square miles and 210 farms. Crossen County has 1502 square miles and 162 farms. How many more square miles are there in Tanner County?

Tanner problem--compare Sears, Enterprise problems

Format	Grade 5	Grade 6
D	69.0	74.1
T	70.4	68.4
V	70.8	67.2

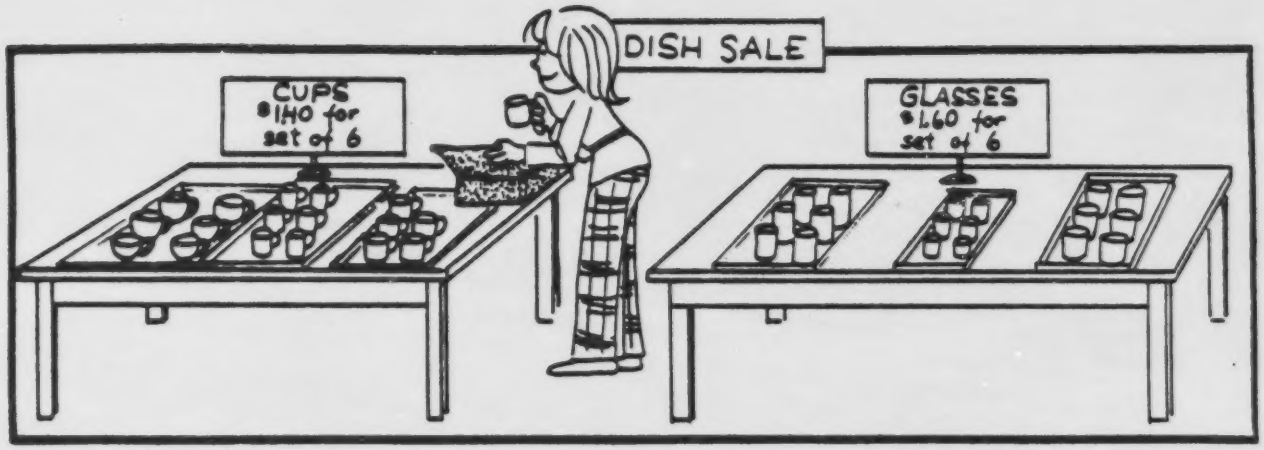
How much less for 4 Pepsi packs than for 4 Coke packs?

Pepsi, $1.10 for 8-pack
Coke, $1.30 for 8-pack
How much less for 4 Pepsi packs than for
4 Coke packs?

John wants to buy some pop. Pepsi costs $1.10 for an 8-pack. Coke costs $1.30 for an 8-pack. How much less do 4 packs of Pepsi cost than 4 packs of Coke?

Colas problem--compare glasses, markers problems

Format	Grade 5	Grade 6
D	30.2	33.9
T	34.8	50.0
V	31.6	41.5



How much less for 3 sets of cups than for 3 sets of glasses?

Cups, $1.40 for set of 6
Glasses, $1.60 for set of 6
How much less for 3 sets of cups than
for 3 sets of glasses?

Kim is buying dishes. Cups cost $1.40 for a set of 6. Glasses cost $1.60 for a set of 6. How much less do 3 sets of cups cost than 3 sets of glasses?

Glasses problem--compare colas, markers problems

Format	Grade 5	Grade 6
D	17.8	24.1
T	25.9	46.9
V	31.5	28.6

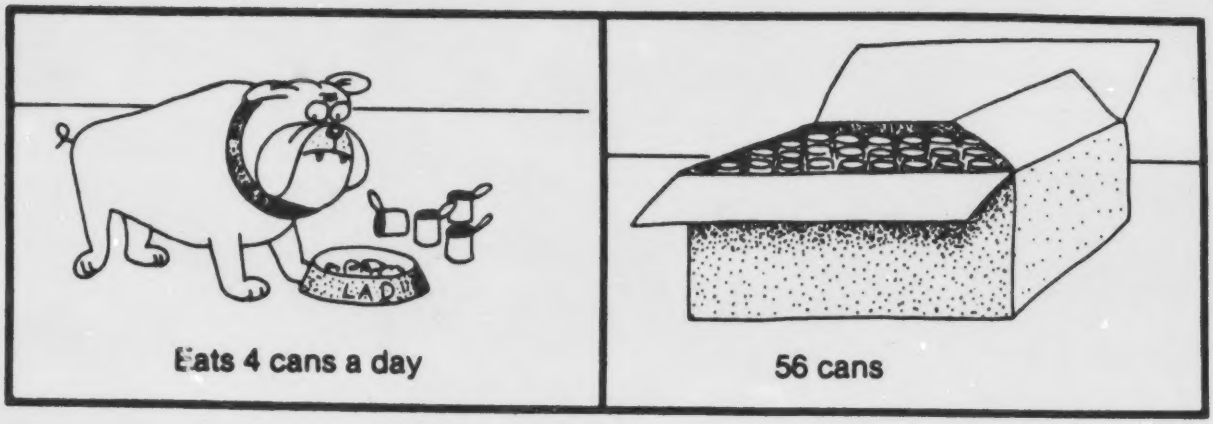
How much less for 2 packs of ball-points than for 2 packs of markers?

Ball-point pens, $1,20 for pack of 4
Markers, $1.40 for pack of 4
How much less for 2 packs of ball-points than for 2 packs of markers?

Pat wants to buy some school supplies. Ball-point pens cost $1.20 for a pack of 4. Markers cost $1.40 for a pack of 4. How much less do 2 packs of ball-point pens cost than 2 packs of markers?

Markers problems--compare colas, glasses problems

Format	Grade 5	Grade 6
D	30.5	50.9
T	28.9	36.5
V	41.3	48.3



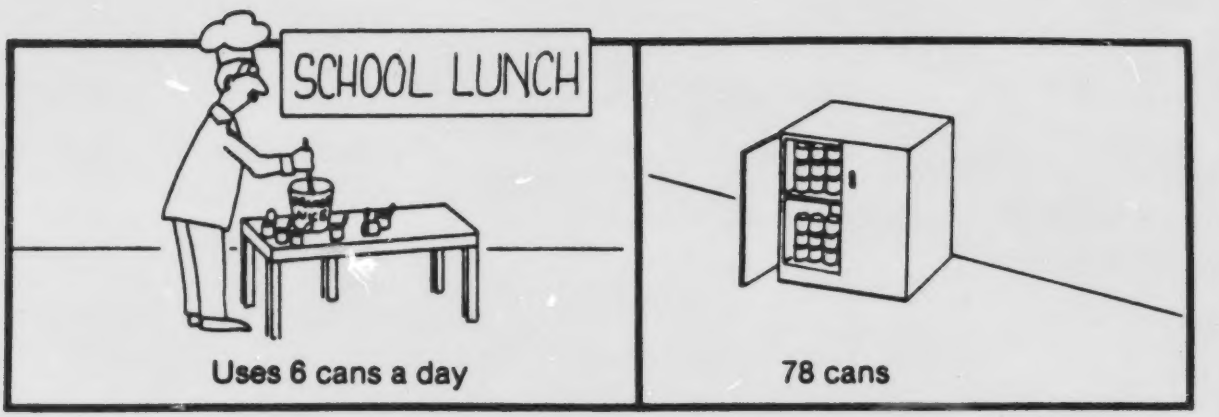
Food for how many days?

Lad eats 4 cans food a day.
56 cans in box
Food for how many days?

Lad eats 4 cans of dog food a day.
There are 56 cans of dog food left in a box. How many days will the food last?

Dog food problem--compare orange juice, oil problems

Format	Grade 5	Grade 6
D	46.8	70.0
T	56.1	70.9
V	50.0	67.2



Cook uses 6 cans orange juice a day.
78 cans in freezer
Juice for how many days?

The school cook uses 6 cans of orange juice a day. There are 78 cans of orange juice in the freezer. How many days will the juice last?

Orange juice problem--compare dog food, oil problems

Format	Grade 5	Grade 6
D	55.9	74.6
T	57.4	63.8
V	52.1	69.0

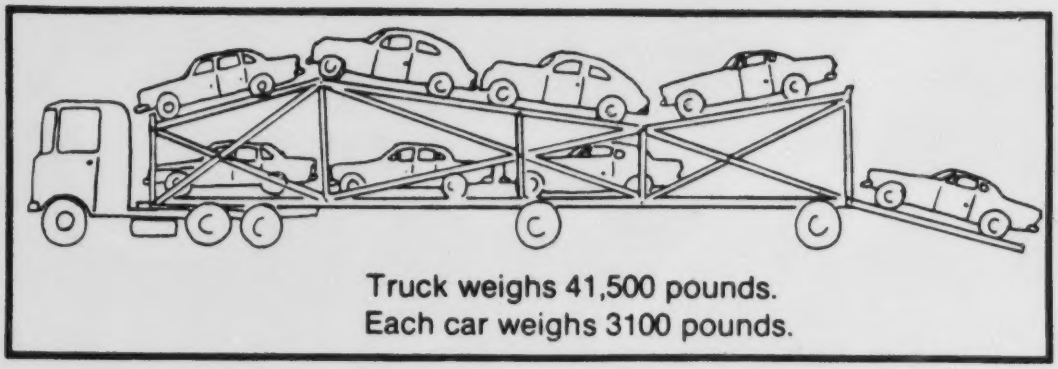
Oil for how many days?

Worker uses 8 cans oil a day
96 cans in closet
Oil for how many days?

A worker uses 8 cans of oil a day.
There are 96 cans of oil in a closet.
How many days will the oil last?

Oil problem--compare dog food, orange juice problems

Format	Grade 5	Grade 6
D	50.9	65.5
T	47.9	65.0
V	50.9	75.9



Truck weighs 41,500 pounds.
Each car weighs 3100 pounds.

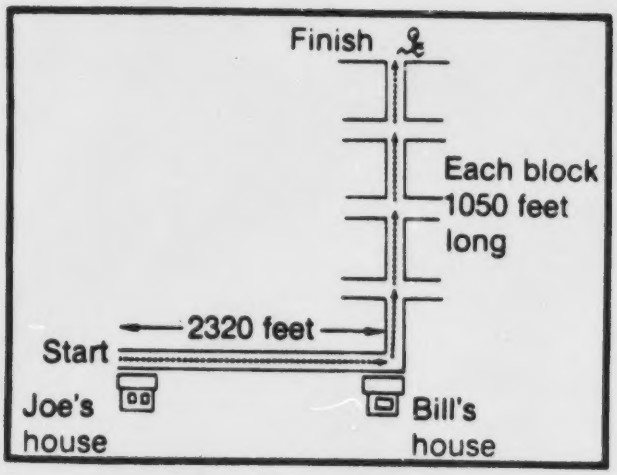
Total weight?

Trailer truck weighs 41,500 pounds.
8 cars on truck
Each car weighs 3100 pounds
Total weight?

An empty trailer truck weighs 41,500 pounds. The truck has 8 cars on it. Each car weighs 3100 pounds. What is the total weight?

Car carrier problem--compare runner, coal problems

Format	Grade 5	Grade 6
D	17.0	32.7
T	26.9	36.5
V	34.0	40.0



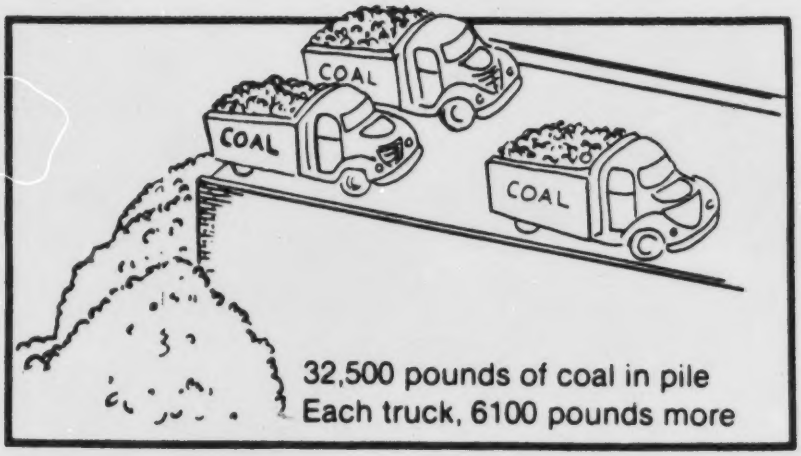
Total distance run?

Ran 2320 feet
Ran 4 more blocks
Each block 1050 feet long
Total distance run?

Tom ran 2320 feet from Joe's house to Bill's house. Then he ran 4 more blocks. Each block was 1050 feet long. What total distance did he run?

Runner problem--compare car carrier, coal problems

Format	Grade 5	Grade 6
D	31.5	33.9
T	26.1	34.5
V	38.6	50.0



Total weight of coal?

City has 32,500 pounds of coal in pile
Gets 3 more truck-loads
Each truck, 6100 pounds of coal
Total weight of coal?

The city has 32,500 pounds of coal in a pile. It gets 3 more truck-loads of coal. Each truck holds 6100 pounds of coal. What total weight of coal does the city have then?

Coal problem--compare car carrier, runner problems

Format	Grade 5	Grade 6
D	16.7	18.3
T	31.5	43.1
V	37.7	30.4

How many markers needed?

First trail marker 225 feet past
beginning of trail
Then a marker every 225 feet
Trail is 7200 feet long
How many trail markers needed?

A park ranger is putting trail markers on a new hiking trail. The first marker will be placed 225 feet past the beginning of the trail. Then a marker will be placed every 225 feet. The trail is 7200 feet long. How many markers will the ranger need?

Trail markers problem--compare flags, street lights problems

Format	Grade 6	Grade 7
D	67.4	77.6
T	48.2	69.8
V	52.7	75.0

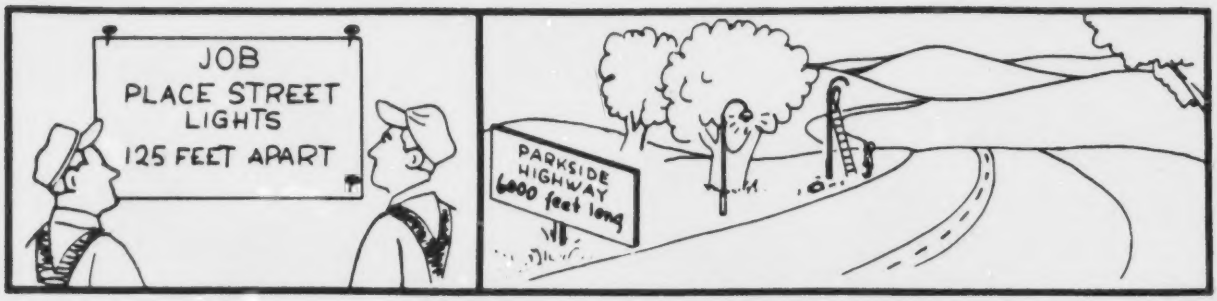
How many flags needed?

First flag 175 feet past start of bridge
Then a flag every 175 feet
Bridge is 4200 feet long
How many flags needed?

Workers are putting flags on a bridge. The first flag will be placed 175 feet past the start of the bridge. Then a flag will be placed every 175 feet. The bridge is 4200 feet long. How many flags will the workers need?

Flags problem--compare trail markers, street lights problems

Format	Grade 6	Grade 7
D	60.3	85.7
T	62.5	74.6
V	66.7	81.0



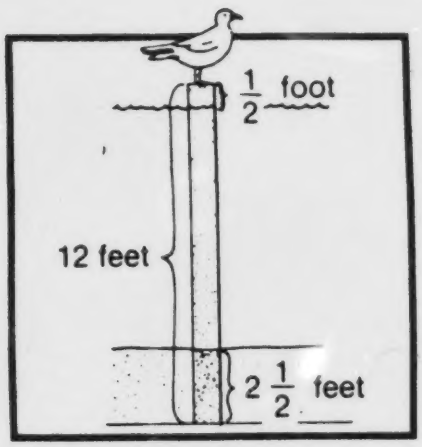
How many street lights needed?

First street light 125 feet past
entrance to Highway
Then a light every 125 feet
Highway is 6000 feet long
How many street lights needed?

The city workers are putting up street lights in the Parkside Highway. The first street light will be placed 125 feet past the entrance to the Highway. Then a light will be placed every 125 feet. The Highway is 6000 feet long. How many street lights will the workers put up?

Street lights problem--compare trail markers, flags problems

Format	Grade 6	Grade 7
D	53.3	80.7
T	63.5	69.5
V	58.5	79.3



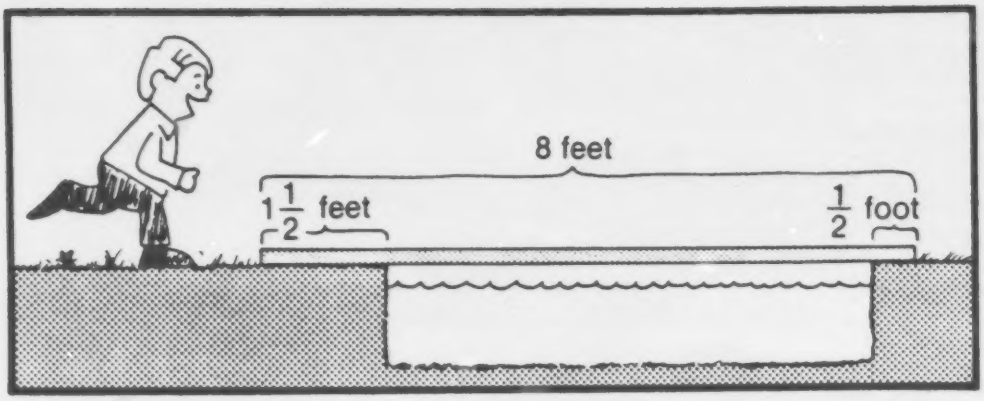
How deep is the river?

Post 12 feet long
$2\frac{1}{2}$ feet in the ground under the river
$\frac{1}{2}$ foot sticks out of the water.
How deep is river?

A post 12 feet long is pounded into the bottom of a river. $2\frac{1}{2}$ feet of the post are in the ground under the river. $\frac{1}{2}$ foot sticks out of the water.
How deep is the river at that point?

Post problem--compare bridge, hole problems

Format	Grade 6	Grade 7
D	9.3	21.4
T	21.2	37.7
V	30.0	44.9



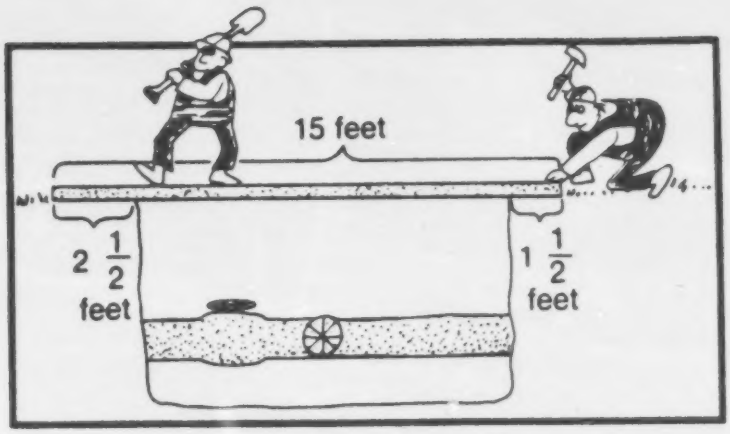
How wide is the stream?

Stream
Board 8 feet long for bridge
$1\frac{1}{2}$ feet on land on one side
$\frac{1}{2}$ foot on land on other side
How wide is stream?

A board 8 feet long is used to make a bridge over a stream. $1\frac{1}{2}$ feet of the board is on land on one side. $\frac{1}{2}$ foot is on land on the other side. How wide is the stream?

Bridge problem--compare post, hole problems

Format	Grade 6	Grade 7
D	40.7	55.0
T	21.8	37.3
V	40.0	50.0



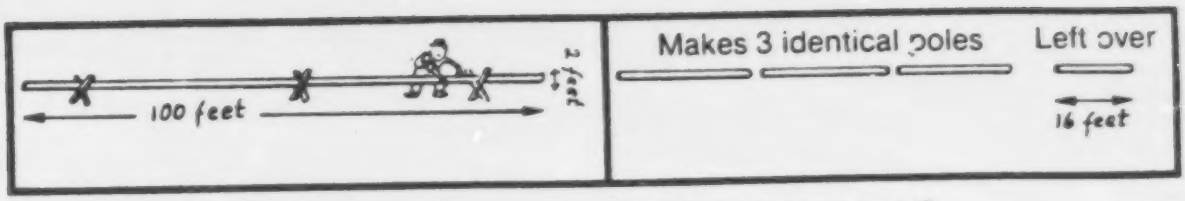
How wide is the hole?

Construction hole
Board 15 feet long across hole
$2\frac{1}{2}$ feet of board on ground on one side
$1\frac{1}{2}$ feet on ground on other side
How wide is the hole?

A board 15 feet long is used to cover a construction hole. $2\frac{1}{2}$ feet of the board are on the ground on one side of the hole. $1\frac{1}{2}$ feet are on the ground on the other side. How wide is the hole?

Hole problem--compare post, bridge problems

Format	Grade 6	Grade 7
D	31.0	44.2
T	19.6	35.2
V	28.6	44.2



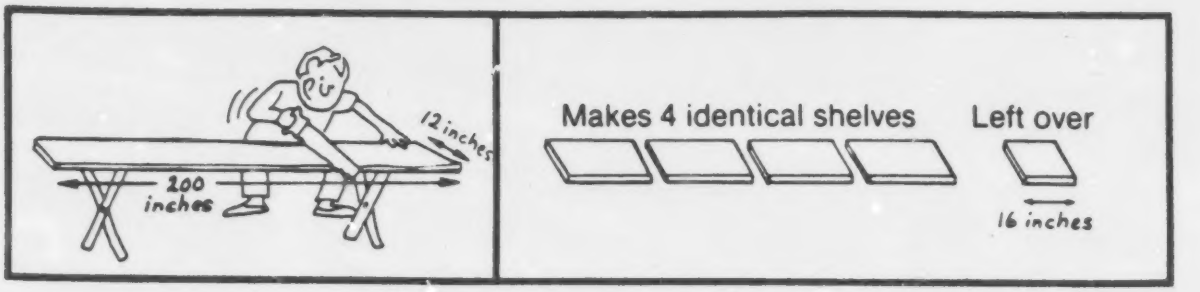
How long is each pole?

Tree trunk, 100 feet long, 2 feet across
Make 3 identical poles, has 16 feet
left over
How long is each pole?

A telephone pole maker has a tree trunk 100 feet long and 2 feet across. He makes 3 identical telephone poles and still has a piece of the tree trunk 16 feet long left over. How long is each telephone pole?

Poles problem--compare shelves, scarves problems

Format	Grade 6	Grade 7
D	18.9	37.5
T	3.8	24.2
V	11.3	23.9



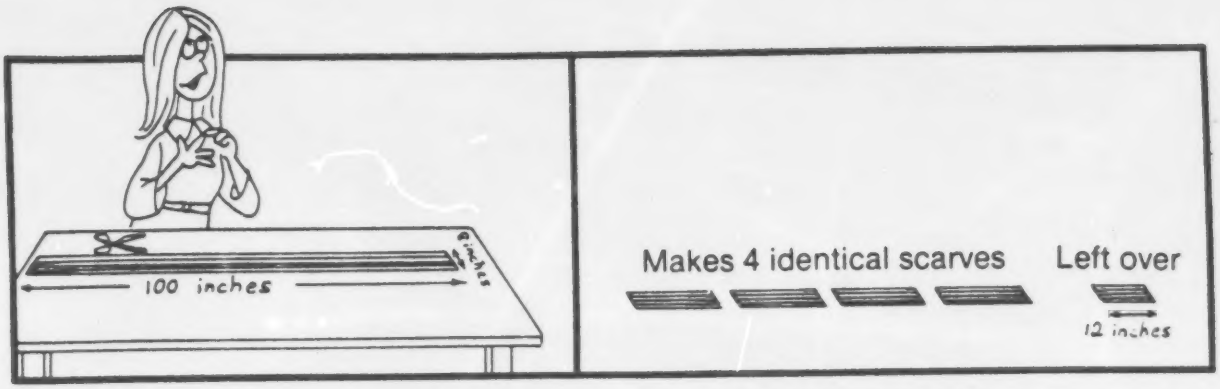
How long is each shelf?

Board, 200 inches long, 12 inches wide
Makes 4 identical shelves, has piece 36 inches left over
How long is each shelf?

A carpenter has a board 200 inches long and 12 inches wide. He makes 4 identical shelves and still has a piece of board 36 inches long left over. How long is each shelf?

Shelves problem--compare scarves, poles problems

Format	Grade 6	Grade 7
D	7.3	27.9
T	10.7	18.9
V	14.6	26.4



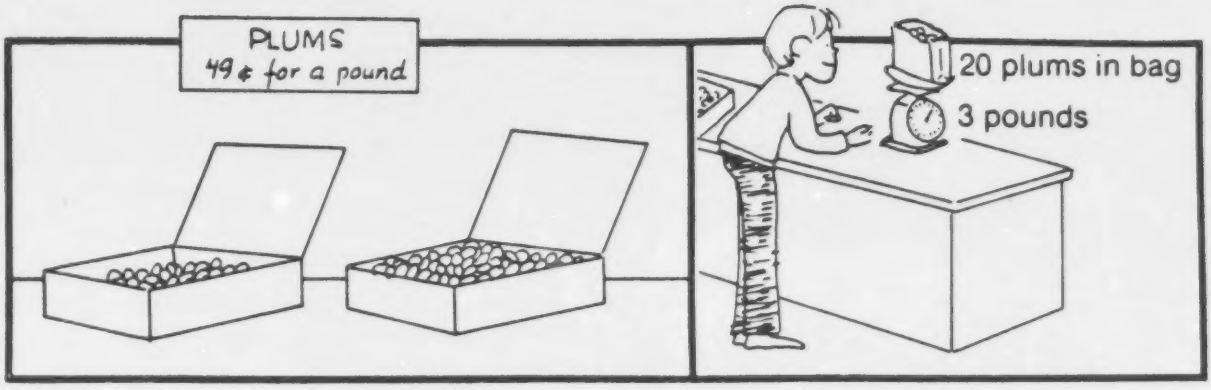
How long is each scarf?

Cloth, 100 inches long, 8 inches wide
Makes 4 identical scarves, has piece 12
inches long left over
How long is each scarf?

A scarf-maker has a piece of cloth 100 inches long and 8 inches wide, He makes 4 identical scarves and still has a piece of cloth 12 inches long left over. How long is each scarf?

Scarves problem--compare shelves, poles problems

Format	Grade 6	Grade 7
D	15.8	36.5
T	20.4	23.5
V	10.0	30.5



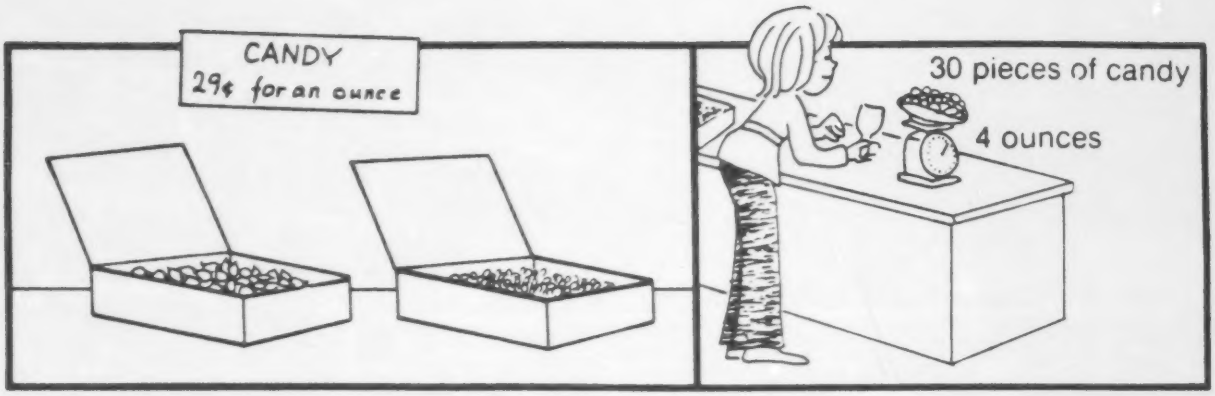
How much will the bag of plums cost?

A pound of plums costs 49¢
Put 20 plums in bag
Bag weighed 3 pounds.
How much will the bag of plums cost?

A pound of plums costs 49¢. Sam put 20 plums in a bag. The bag of plums weighed 3 pounds. How much will the bag of plums cost?

Plums 67 problem--compare candy 67, nuts 67 problems

Format	Grade 6	Grade 7
D	73.8	87.7
T	68.5	83.6
V	72.7	81.0



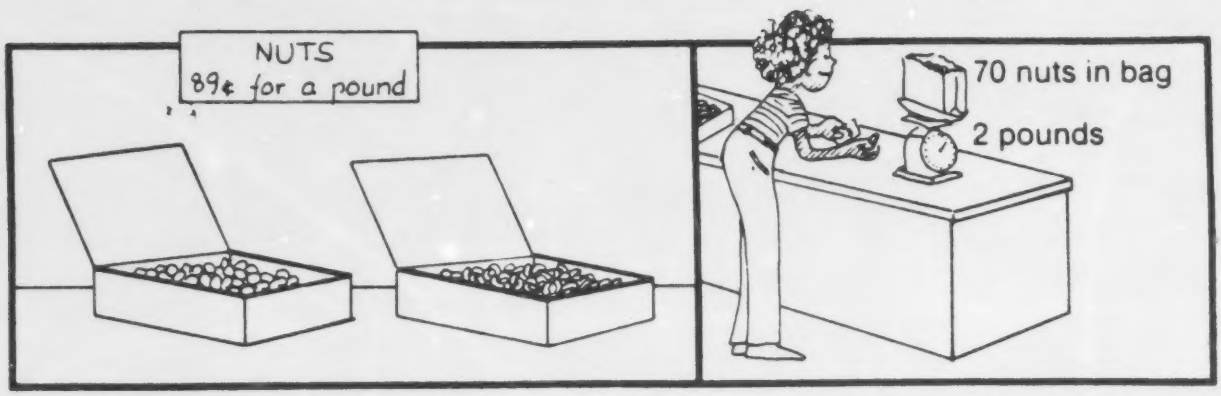
How much will the candy cost?

An ounce of candy costs 29¢.
Picked 30 pieces
Weighed 4 ounces
How much will the candy cost?

An ounce of hard candy costs 29¢. Kate picked 30 pieces of candy. Her candy weighed 4 ounces. How much will the candy cost?

Candy 67 problem--compare plums 67, nuts 67 problems

Format	Grade 6	Grade 7
D	78.2	95.0
T	64.9	81.0
V	66.7	81.5



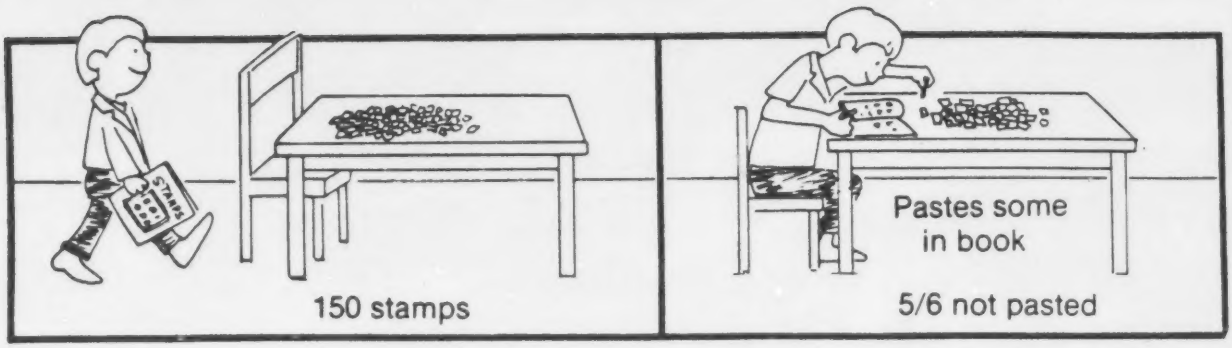
How much will the bag of nuts cost?

A pound of unshelled nuts costs 89¢.
Put 70 nuts in a bag
Bag weighed 2 pounds
How much will the bag of nuts cost?

A pound of unshelled nuts cost 89¢.
Peg put 70 nuts in a bag. The bag of nuts weighed 2 pounds. How much will the bag of nuts cost?

Nuts 67 problem--compare plums 67, candy 67 problems

Format	Grade 6	Grade 7
D	77.6	87.9
T	78.3	77.8
V	72.0	90.0



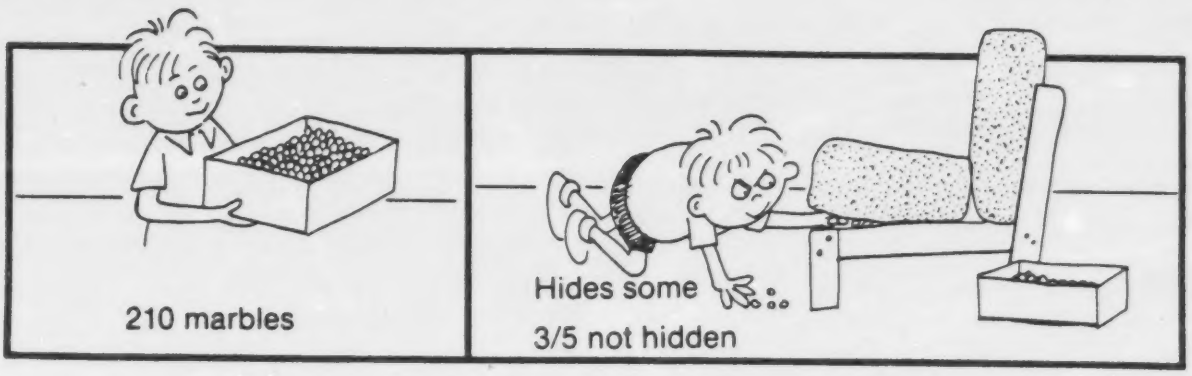
How many stamps not pasted?

Has 150 stamps
Pastes some in book
$\frac{5}{6}$ are not pasted
How many not pasted?

Joe has 150 stamps. He pastes some of the stamps in a stamp book. $\frac{5}{6}$ are not pasted. How many stamps are not pasted in the stamp book?

Stamps 7 problem--compare marbles 7, library 7 problems

Format	Grade 7
D	21.3
T	35.3
V	25.6



How many marbles not hidden?

Has 210 marbles
Hides some
$\frac{3}{5}$ are not hidden
How many not hidden?

Kim has 210 marbles. She hides some of the marbles. $\frac{3}{5}$ are not hidden. How many marbles are not hidden?

Marbles 7 problem--compare stamps 7, library 7 problems

Format	Grade 7
D	27.5
T	24.5
V	22.7

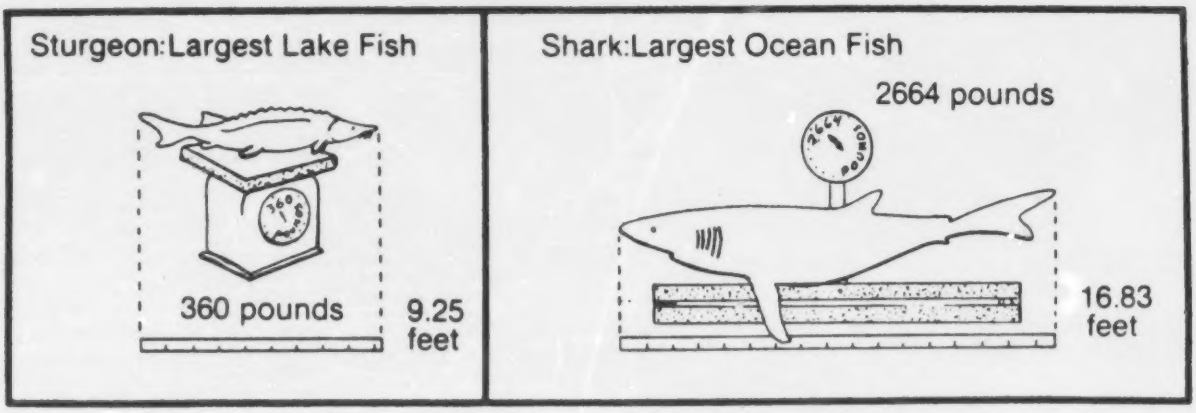
How many books not checked out?

Library has 280 books
Some books checked out
$\frac{2}{5}$ are not checked out
How many not checked out?

The school library has 280 books. Today children check out some books. $\frac{2}{5}$ are not checked out. How many books are not checked out of the library?

Library 7 problem--compare stamps 7, marbles 7 problems

Format	Grade 7
D	20.9
T	30.0
V	28.6



How much longer was the shark?

Largest fish ever caught
Lake fish, sturgeon, 360 pounds,
9.25 feet long
Ocean fish, shark, 2664 pounds,
16.83 feet long
How much longer was the shark?

The largest lake fish ever caught was a white sturgeon. It weighed 360 pounds and it was 9.25 feet long. The largest ocean fish ever caught was a white shark. It weighed 2664 pounds and it was 16.83 feet long. How much longer was the shark?

Fish length problem--compare rain, gas problems

Format	Grade 7
D	92.7
T	85.0
V	87.5

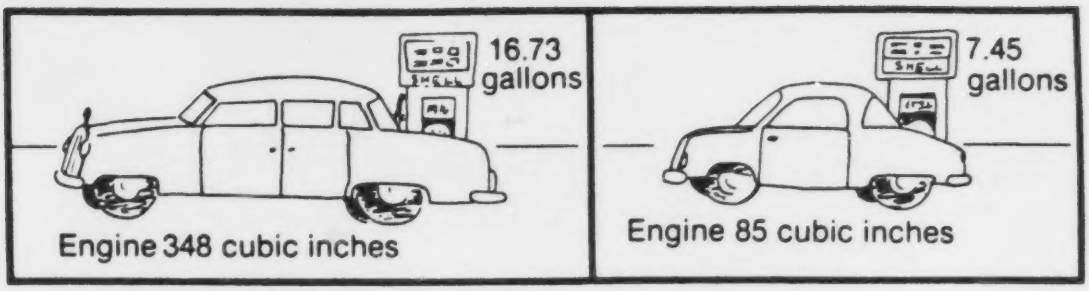
How much more rain in April?

City Weather Station
March, highest temperature 54°,
8.55 inches of rain
April, highest temperature 68°,
17.93 inches of rain
How much more rain in April?

In March, the highest temperature was 54°, and there were 8.55 inches of rain recorded at the City Weather Station. In April, the highest temperature was 68°, and there were 17.93 inches of rain recorded. How much more rain was there in April?

Rain problem--compare fish length, gas problems

Format	Grade 7
D	94.9
T	84.9
V	89.1



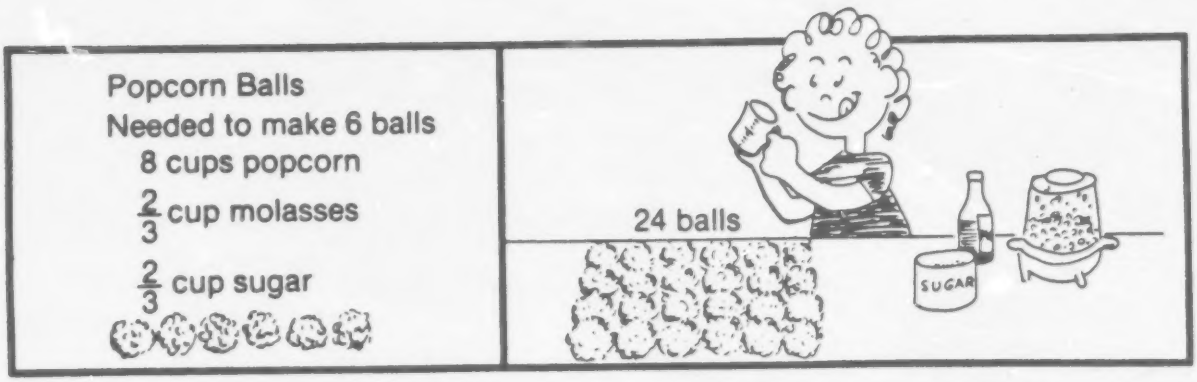
How much more gas for the big car?

Gas station
Big car, 348 cubic inch engine, got
16.73 gallons of gas
Small car, 85 cubic inch engine, got
7.45 gallons of gas
How much more gas for the big car?

At one gas station, a big car with a 348 cubic inch engine got 16.73 gallons of gasoline. At another gas station, a small car with an 85 cubic inch engine got 7.45 gallons of gasoline. How much more gasoline did the big car get?

Gas problem--compare fish length, rain problems

Format	Grade 7
D	84.4
T	89.3
V	82.8



Used how much popcorn?

Needed to make 6 popcorn balls

8 cups popcorn

$\frac{2}{3}$ cup molasses

$\frac{2}{3}$ cup sugar

Made 24 balls
Used how much popcorn?

To make 6 popcorn balls, you need 8 cups of popcorn, $\frac{2}{3}$ cup of molasses, and $\frac{2}{3}$ cup of sugar. Pam made 24 popcorn balls. How much popcorn did she use?

Popcorn problem--compare birdhouses, cheerleaders problems

Format	Grade 7
D	41.3
T	47.2
V	40.7

Needed to make 3 bird houses
4 pints of paint
$\frac{1}{2}$ yard of wooden rod
$\frac{3}{4}$ sheet of plywood
Scouts made 24 houses.
Used how much paint?

To make 3 bird houses, you need 4 pints of paint, $\frac{1}{2}$ yard of wooden rod, and $\frac{3}{4}$ of a sheet of plywood. Some scouts made 24 bird houses for a project. How much paint did they use?

Birdhouses problem--compare popcorn, cheerleaders problems

Format	Grade 7
D	24.5
T	29.3
V	29.5

Used how much blue cloth?

Needed to make 3 cheerleader dresses
5 yards blue cloth
$1\frac{1}{2}$ yards yellow cloth
$\frac{3}{4}$ yards trim
Made 12 dresses
Used how much blue cloth?

To make 3 cheerleader dresses, you need 5 yards of blue cloth, $1\frac{1}{2}$ yards of yellow cloth, and $\frac{3}{4}$ yards of trim. Carol made 12 cheerleader dresses. How much blue cloth did she use?

Cheerleaders problem--compare popcorn, birdhouses problems

Format	Grade 7
D	26.8
T	28.6
V	17.5

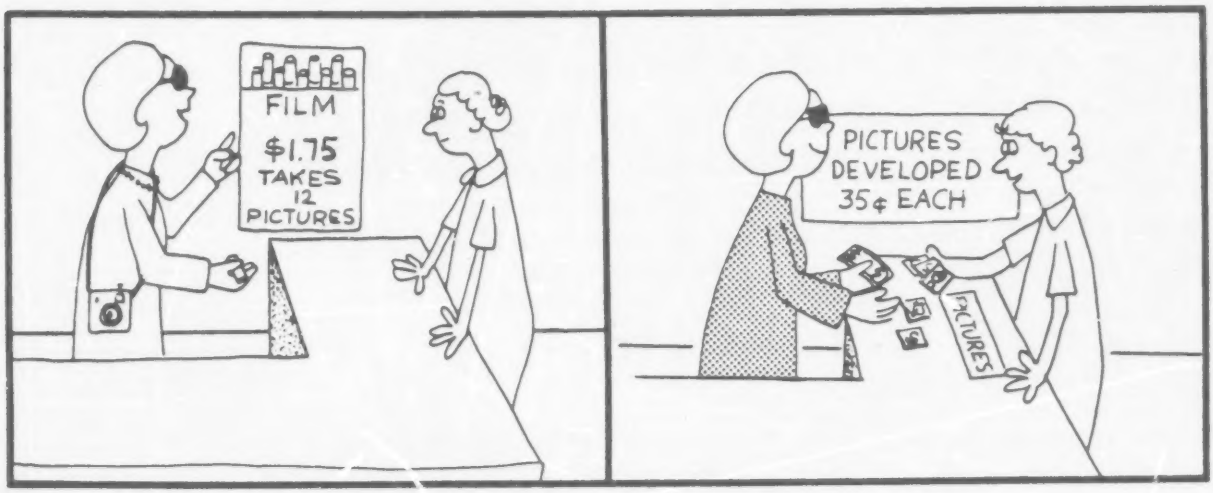
Cost for coupons and tickets for 8 friends?

Movie coupon book, $6.20
8 coupons in book
Movie costs 25¢ with a coupon
Cost for coupons and tickets for 8 friends?

The Flick Theatre sells a coupon book for $6.20. There are 8 coupons in the book. A movie at the Flick costs only 25¢ along with a coupon. What will be the cost for coupons and tickets for 8 friends to go to the movie?

Tickets problem--compare film, orange drink problems

Format	Grade 7
D	38.6
T	32.1
V	26.8



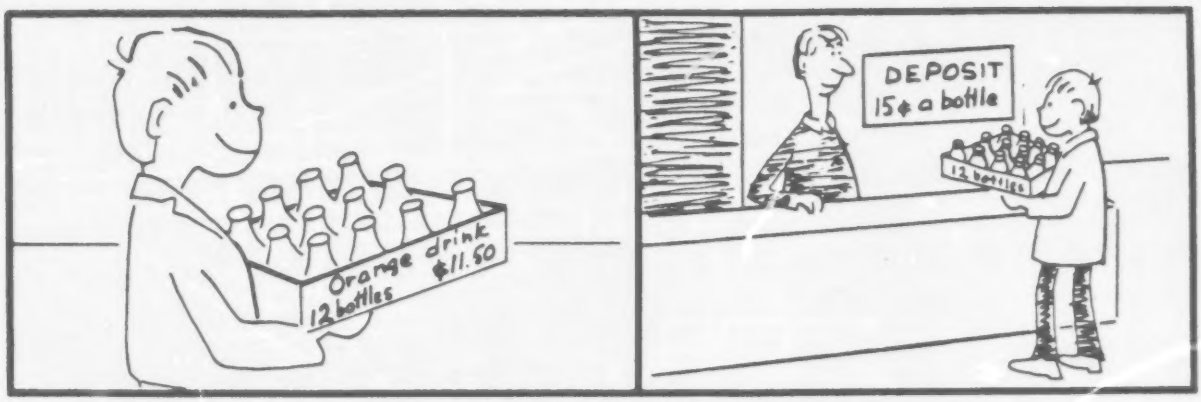
Cost for film and development for 12 pictures?

Roll of film, $1.75
Takes 12 pictures
Costs 35¢ to have each picture developed
Cost for film and development for 12 pictures?

A roll of film costs $1.75. You can get 12 pictures from a roll. Then it costs 35¢ to get each picture developed. What will be the cost for film and development for 12 pictures?

Film problem--compare tickets, orange drink problems

Format	Grade 7
D	52.4
T	46.0
V	25.0



Cost for orange drink and deposit for 12 bottles?

Case of bottles of orange drink, $11.50
12 bottles in case
Costs 15¢ deposit for each bottle
Cost for orange drink and deposit for
12 bottles?

A case of bottles of orange drink costs $11.50. There are 12 bottles in the case. There is also a 15¢ deposit for each bottle in the case. What will be the total cost for 12 bottles?

Orange drink problem--compare tickets. film problems

Format	Grade 7
D	25.0
T	41.8
V	36.4

(Cover page--all tests) NAME_____

STORY PROBLEMS: DIRECTIONS

You are going to solve some story problems. Some of the problems will have pictures and some will have just words. When you do a problem, show how you got your answer. Then put an answer on the line next to the word ANSWER_____. If you make a mistake, just put an X and start over.

EXAMPLE 1.

10 snowballs
7 melted
Made 4 more
How many now?

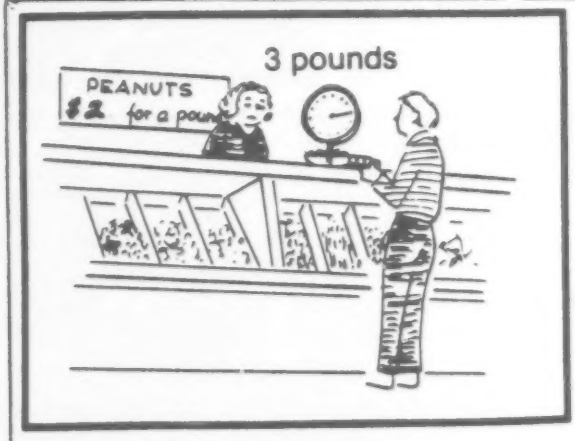
SHOW WORK HERE.

$$\begin{array}{r} 10 \\ -\ 7 \\ \hline 3 \end{array} \qquad \begin{array}{r} 3 \\ +\ 4 \\ \hline 7 \end{array}$$

ANSWER 7

Always show how you got your answer. Even if you can do the work in your head, write it all down, as in Example 1. Now look at the next example.

EXAMPLE 2.



What is the cost?

SHOW WORK HERE.

$$\begin{array}{r} \cancel{3} \\ +\ \cancel{2} \\ \hline \cancel{5} \end{array} \qquad 3 \times 2 = 6$$

ANSWER #6

In example 2 you see how to put an X through a mistake. DO NOT ERASE.

Some problems have information that you don't need to solve the problem. Look at Example 3. Solve it. What information is not needed?

EXAMPLE 3.

Steve has 3 different kinds of gum. He has 4 packs of gum. There are 5 sticks in each pack. How many sticks of gum does he have?

SHOW WORK HERE.

ANSWER_____

You are to work more problems like these. Work quickly but try not to make mistakes. If you get stuck, go on to the next problem and come back to the hard one later. If you can't read a word, raise your hand. Do the best you can.

Appendix C

The "What Do I Do?" Test

WHAT DO I DO?

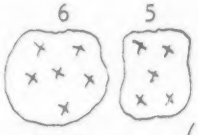
Name _____

Directions Read the problem. Then decide whether to +, −, x, or ÷. Put the numbers in the correct blank. Leave the other spaces blank. You do not have to figure out the answer.

Example 8, then lost 5. How many now?

Answer: ___+___ 8 - 5 ___x___ ___÷___

Example 6 5



How many now?

Answer: 6 + 5 ___-___ ___x___ ___÷___

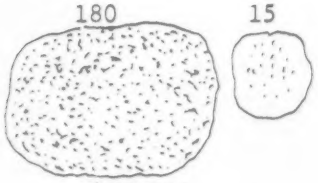
1. 150, then 72 went away. How many now?

Answer: ___+___ ___-___ ___x___ ___÷___

2. 12 rows, 25 each row. How many?

Answer: ___+___ ___-___ ___x___ ___÷___

3. 180 15



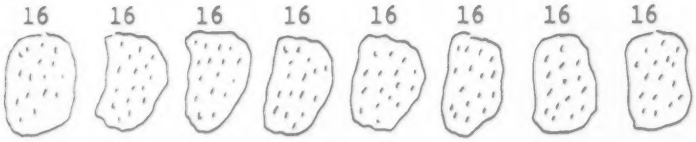
How many now?

Answer: ___+___ ___-___ ___x___ ___÷___

4. 248 in all, in 4 equal parts. How many in each part?

Answer: ___+___ ___-___ ___x___ ___÷___

5. 16 16 16 16 16 16 16 16



How many?

Answer: ___+___ ___-___ ___x___ ___÷___

(over)

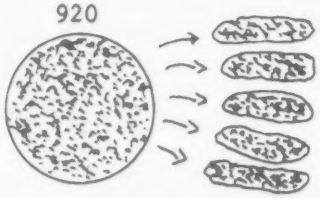
6. 243

How many now?

Answer: ___+___ ___-___ ___x___ ___÷___

---

7. 920



Passed out fairly. How many in each?

Answer: ___+___ ___-___ ___x___ ___÷___

---

8. 84 in one row, 21 in another row. How many?

Answer: ___+___ ___-___ ___x___ ___÷___

---

9. 78 in all, in 3 equal rows. How many in each row?

Answer: ___+___ ___-___ ___x___ ___÷___

---

10. 54, 6 got sick. How many not sick?

Answer: ___+___ ___-___ ___x___ ___÷___

---

11. Have 4, 36 in each. How many?

Answer: ___+___ ___-___ ___x___ ___÷___

---

12. 72, then got 18 more. How many now?

Answer: ___+___ ___-___ ___x___ ___÷___